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Our Review

Most people who have put their hand to it will probably feel inclined to agree with the opinion that " reviewing," when any attempt is made to penetrate beyond the level highway of platitude, is not by any means the simplest of tasks—and this, in spite of the fact that the reviewing in all likelihood has reference to a complete work. When looking back upon 1940 we are regarding, so far as its events are concerned, a period which includes neither a beginning nor an end. Ere the year opened, the country had embarked upon a course which all recognize must be pursued unswervingly to its end ; and the close finds us still upon a difficult road.

When the history of 1940 comes to be written—that is to say, when its events can be viewed in relation to their consequences —it may well prove that the happenings of the past twelve months should be ranked among the most crucial in the long and glorious history of our great nation. In matters of war, cause and effect are often so widely separated that it has of necessity to be left to the long view of the historian to place them in juxtaposition. But in the meantime even the imperfect ability to assess values which the short view offers is amply sufficient to afford assurance of the unabated confidence of the country in the final outcome of the titanic struggle in which it is engaged.

We were all aware when the year opened that a gigantic task confronted us, and nothing has since happened to modify this view. Rather have a succession of disappointing events since added to the proportions of the task as it then presented itself. There is no need to recount here these untoward happenings ; suffice it to say that, along with an addition to the numbers of those opposed to us, through the entry of Italy into the war on the side of Germany, during the latter half of the year France, the great military nation side by side with whom we had so confidently expected to see the conflict through, has found herself, through force of circumstances, occupying an unhappy position where she is more a liability than an asset to our cause. Why it was that the war found our country in such a state of unpreparedness, it is useless to enquire now. In days gone by, opportunity may have presented itself to overcome this disability of unreadiness, but modern methods of warfare render the process of " catching-up " in armaments a vastly more difficult and more costly process than was formerly the case. Briefly, then—without waiting for the verdict of the historian, and without revealing any secret—it may be said that 1940 is a year which has been devoted largely to preparation.

The National Effort

Recognition of the fact that preparation for the ordeal which was already upon us has absorbed so great a part of the national effort during the year must not blind us to the magnificent exploits of the Navy, Army, and Air Force—exploits by which alone we have been afforded the opportunity of continuing these preparations, and by the recital of which historians will thrill British generations yet unborn. Of such gallantry the civil population have shown themselves to be entirely worthy—whether considered individually or collectively, in private or professional life, or in industry. They have done what they have been called upon to do, ungrudgingly, even cheerfully, with the full knowledge that they must be called upon to do a great deal more. They have suffered much, and can be in no doubt that they will have to suffer much more, but to this suffering has at no time been added the bitterness of defeat. Any glamour which warlike action may once have possessed has been blasted away, revealing a horror at which the civilized world stands aghast. We are, indeed, confronted with " total warfare " in its literal sense. Thus has the need for steadfast courage—the opportunity for heroism—been extended right down to the mother and child in the home. In every section of the community, in every kind of circumstance, and at all hours of the day and night, the highest form of bravery has abounded among the people. So that we must all echo the published declaration of Mr. Frank H. Jones : " I am proud to be British."

Where there has been so much that is meritorious in both public service and private life, there is little need to differentiate, but it is appropriate here to refer to the devotion to their work, often in the face of hideous danger, of all grades engaged in the Gas Industry. Here, again, for obvious reasons, we must wait upon the historian, but meanwhile no one will forget the outstanding instance published to the world of the work in connexion with the removal of a giant unexploded bomb which had buried itself in the ground close to St. Paul's Cathedral.

Growing Demands

But although this steadfast courage is vital, it is not of itself sufficient. Modern warfare is waged with overwhelming quantities of material of ever growing costliness and capacity for destruction, and no past experience can be a criterion of present needs. It may be that the effort now is greater than has ever before been made, but it is not enough. Evidently this is becoming more and more recognized in quarters that count, and so the year closes upon a note which is of far better augury than the smooth complacency which was so much in evidence at its opening.

It is not within the province of a review of 1940 to speculate upon what may happen in the next twelve months, but it may be permitted to express the hope that nothing will be left undone that will help to preserve complete unity of feeling. The people have been wonderful ; they will be still more wonderful. But we all find a difficulty at times in following affairs and, while anxious to do the best, experience feelings of uncertainty as to what that best may be. Rules, regulations, orders, exhortations, and recommendations have descended upon us in profusion. Yet we are still faced with hundreds of thousands of " unemployed," while the " greatest ever " munitions drive is in full force. What is the explanation ?

With taxation already at levels never before reached, and a war expenditure of some nine or ten millions a day—a very large proportion of it going back into the pockets of our own people as wages—it goes without saying that a new financial condition has been in the making during the year. While heavy losses have descended upon one section of the community, another portion is receiving remuneration at a rate altogether out of line with custom. No one would blame people for accepting such remuneration, but a position of

this kind must distort the monetary situation. Much labour and expense, too, have been involved in efforts to secure the return to the Government, in the form of savings, of as large a proportion as possible of the money thus paid out—as well as of any other of the community's resources. Whether these " savings " are to remain voluntary or to be made compulsory, it is clear that they must come largely from those whose financial position has been improved by the war. Even though one would hesitate to place the financial aspect in the front line, when there are so many grave obstacles to be surmounted, it is a major problem. It is, in fact, a vital part of " total war."

To the taxation to which we are already accustomed—in principle, if not in bulk—there has now been added a Purchase Tax of staggering proportions. The effects of this new tax have still to be demonstrated, but it can hardly fail to exercise a marked influence upon our economic structure. And to this element of uncertainty falls to be added another. All through 1940 there has continued that shifting of population, termed evacuation and reception, which was inaugurated almost immediately on the outbreak of war. Events have amply proved its wisdom, and we are grateful to those in authority who began it so early ; but it has been a step of grave import from the financial point of view. It has also, of course, meant breaks in family life and in custom of a nature unknown in the modern history of our country, and destined to exercise an influence far into the future.

The coming of 1940 found the British people united, and the year leaves them united. So long as they remain so, no odds will prove too great for them to face and overcome. It is everybody's war, and each one is anxious to do his best. Let there be no thought of pact or party, or of any of those things which, side by side with our present danger, must have the appearance of irritating trivialities. With sound leadership and a united determination to persevere, at whatever cost, until final victory be achieved, we can all feel hope that 1941 may witness a successful outcome of the struggle to remain free to live our lives as we may wish.

The National Gas Council

For the National Gas Council, as for everyone else, the year now closing has been abnormal. Many difficulties, both expected and unexpected, have had to be faced, but thanks to the strength of the organization and to the loyal support which it has received from its members, these difficulties have been either overcome or, at least, mitigated. In the early part of the year problems relating in particular to coal supply and transport demanded unremitting attention, while later, after the collapse of France, and the intensification of air attacks against cities and towns, a new set of problems arose. Many of these had necessarily to be dealt with by those in charge of the undertakings affected, but in doing so they were assisted not only by such direct help as the Council could offer, but also by the plans previously made to deal with anticipated emergencies. There was a time when it seemed to some that the Civil Defence preparations were unnecessarily elaborate, and also that the emphasis which the Council placed on the need for making them was not required ; but subsequent events have shown how important they were. Interruptions in supply have been inevitable when works and mains have been damaged by enemy action, but plans carefully made beforehand, coupled with individual initiative, skill, and courage of a high order, have enabled supply to be restored with a speed which in some cases has been little short of marvellous.

Legislation

The legislation affecting the Gas Industry passed during the year was all of a wartime character, and though in some cases it took the form of Acts of Parliament, in the main it was effected by Orders under the Defence Regulations. The Finance (No. 2) Act, 1940, brought into operation the Purchase Tax adumbrated in an earlier Bill subsequently withdrawn. Under the Act, gas, in common with water and electricity, is exempt from the tax, but gas appliances for domestic use are subject to it, while those for industrial or commercial use, including those used in hotels and boarding houses, escape.

An Act of importance to London undertakings was the Rating and Valuation (Postponement of Valuation) Act, 1940, in which, on the urgent representations of the Conjoint Conference of Public Utility Associations, a special clause was inserted giving them the power, otherwise not available except at the end of the postponed quinquennium, to ask for a revaluation if they could show that they had been particularly affected by the present emergency. In view of subsequent happenings, this power may prove very useful. Joint action was also successfully taken to obtain the exclusion from the Courts Emergency Powers Bill of an amendment, the effect of which would have been to make it necessary for public utility undertakers to apply to the County Court before cutting off the supply to any consumers.

The output of Orders under the Defence Regulations which affected the Gas Industry in greater or less degree was not so overwhelming as in the months immediately following the outbreak of war, but was none the less considerable and constant. Relevant Orders were carefully scrutinized, and members were not only informed of their terms, but were offered such advice and guidance about their interpretation and operation as seemed likely to be helpful. The position in regard to the Fuel and Lighting Order, 1939, by which a system of rationing was imposed upon gas and electricity, is that in December of that year, as a result of the recommendations contained in the Memorandum prepared by the Joint Gas and Electricity Committee and submitted to the Secretary for Mines, the Government decided to repeal the Order in so far as it related to gas and electricity, and to prepare another on lines suggested by the Joint Committee, which would not come into force unless and until a change in existing circumstances should make it necessary to reintroduce rationing. Certain conditions as to the preparation of new rationing forms were imposed, and an undertaking was given that neither of the two Industries concerned would take any active steps which might conflict with the Government's appeal for economy in the use of fuel. Members were notified by the Council of the obligation to prepare forms, but, as circumstances have not rendered it necessary to reintroduce rationing, the proposal to draft a new Order remains in abeyance.

During the year the Defence (Gas Charges) Order, 1939, has, following representations made by the Council, been amended by the Defence (Gas Charges) No. 2 Order. It will be remembered that the original Order permitted gas undertakings which had manufactured less gas during the war period than under peace time conditions to raise the price of gas without being subject to the consequences which would normally follow in accordance with the provisions of the Acts and Orders under which they operate. The effect of the amending Order is to permit undertakings to add any increase in the net cost of coal and oil to the additions permitted by the original Order.

Orders relating to the control of iron and steel, of timber, of fertilizers, and to many other matters all of which touch the interests of gas undertakings to some extent, have been issued in profusion, but in a short review, it is impossible to deal with each of them individually. Some, however, are specifically mentioned later.

Coal

At the beginning of the year the chief problem which confronted the Council related to coal. Supplies were not at that time adequate, transport was slow and irregular, and the position in regard to price, quality, and contract conditions was unsatisfactory. The issue of the Railways (Demurrage Charges) Order late in 1939, by which demurrage charges were increased and the permitted periods of wagon retention were shortened, was an endeavour by the Minister of Transport to speed up the turn-round of wagons. It was seen at once, however, that it was physically impossible, owing to the irregularity of coal deliveries and other causes outside their control, for gas undertakers to comply with the requirements of the Order. On the advice of the Council, its members, from whom demurrage charges under the Order were demanded, have (where circumstances warrant the course) relied on the assurance given by the

Minister in introducing the Order that it was not intended thereby to penalize anyone who, through no fault of his own, was unable to obey its provisions. The Conjoint Conference then took up the question and made strong representations to the Minister, with the result that charges incurred between Dec. 18, 1936, and Feb. 29, 1940, were cancelled and the free period was somewhat extended. These concessions, helpful though they were, have proved insufficient, and members are still compelled, therefore, to rely for exemption from demurrage charges upon the Minister's assurances.

Detailed statistics with regard to the coal requirements of undertakings have been prepared by the Council, and they are therefore able to review the position from week to week. Whenever necessary, representations are made to the Mines Department, the Ministry of Transport, or the Railway Executive Committee in order to ensure as far as possible that undertakings are kept adequately supplied.

Again, the position in regard to prices and cognate matters was and remains unsatisfactory. On the one hand, by the suspension of the activities of the Committees of Investigation and the Central Appeal Tribunal, and the refusal of the Mines Department to provide any substitute for them other than the Central Price Regulation Committee to which the Minister might refer complaints, consumers were deprived of the only means open to them of submitting their grievances to an independent Tribunal.

On the other hand, considerable dissatisfaction has been expressed at the policy adopted by some Coal Selling Organizations in raising prices upon the ground that it is necessary to bring the price of that particular class of coal into line with the " general level of price." The question has been referred to the Mines Department, who are at present considering the whole position. In addition, the Coal Selling Organizations appear to enjoy almost complete freedom in imposing upon consumers new contract conditions which they are pleased to call Standard Conditions of Contract. An outstanding instance is that of the Midland (Amalgamated) District Selling Organization, which imposed contract conditions radically different from those formerly in operation without consulting the public utilities. A protest against such arbitrary treatment was lodged both with the District Organization in question, and with the Mines Department, but in the absence during the war of any Tribunal to which complaint might be made, no more effective measures can be taken. Other selling organizations have proved more reasonable and it has been possible, after consultation, to obtain modifications of conditions which would otherwise have been imposed.

The Coal Supply Order, 1940, which empowers the Board of Trade to issue directions as to the disposal of coal wholesale and to specify the particular use or consumption to which such coal might be applied, was primarily intended to cover coal for export, but the Council was advised that it would be applicable, in certain cases, to inland coal and might thereby be helpful to gas undertakings. The Council has made representations to the Mines Department that no directions affecting gas undertakings should be made under the Order without previous consultation.

War Damage

The issue of the Bill dealing with war damage to property has brought within sight a solution of a question which has from the beginning of the war exercised the attention of the Council, and which since the opening of intensified air attack has become acute. Originally the Government decided that owners of buildings destroyed or damaged as the result of enemy action should be compensated after the war in so far as the finances of the Nation would allow. This proposal was generally regarded as unsatisfactory, and its endorsement by a Committee presided over by Lord Weir did not stifle criticism. Several alternative schemes were suggested, including one by the Federation of British Industries and the Associated Chambers of Commerce, which proposed that there should be a compulsory Government scheme of insurance, providing for full compensation for war damage to fixed property with a uniform wartime premium of 2s. per cent. per annum, to be supplemented if necessary after the end of the war by a further premium not exceeding 10s. per cent. This scheme was also criticized, and in view of the prevailing uncertainty the Urgency Committee of the Council, having regard to the fact that the public utilities represented by the Conjoint Conference were similarly placed, decided to refer the matter to the Executive Committee of that body. In the meantime, another Committee was set up by the Government " to advise as to the general principles on which physical damage to general property arising from enemy action should be assessed by the Compensation Board " which it was proposed to set up.

The Report of this Committee specifically stated that the Government scheme did not extend to real property " belonging to Local Authorities and Public Utility Undertakings," in regard to which it was stated " special arrangements will eventually be made." After discussion, from which it appeared that a scheme which the electricity interests had formulated might not be suitable for gas interests without modification, it was decided to seek an interview with the Treasury in order, if possible, to obtain some authoritative statement as to the intentions of the Government with regard to public utilities. A representative deputation had a meeting with a representative of the Treasury in May, when it was suggested that public utilities did not come within the general scheme of the Government, but were covered by the Essential Buildings and Plant (Repair of War Damage) Act, 1939, and the Housing (Emergency Powers) Act. Under these Acts provision is made for immediate loans by the Government to cover essential repairs, but no provision is made for compensation.

The Committee, considering that there was no justification for excluding public utilities from the general Government assurance that as far as public funds were available compensation would be paid to those who had suffered war damage, decided that representations on the point should be made to the Treasury. This was accordingly done.

The War Damage Bill issued recently recognizes that public utilities are in a special category, and by Clause 30 provides that they will be the subject of further legislation which, after consultation with them, will be brought before Parliament shortly, and in which provision will be made for the payment of contributions and the basis of compensation. There are, however, powers in the interval to provide undertakings in need of finance for urgent repairs with payments on account.

Clauses 33 and 34 deal with the Housing (Emergency Powers) Act and the Essential Buildings and Plant (Repair of War Damage) Act, and give power to credit compensation against any loan which has been or may be made by a Department under the Acts. By Part II of the Bill two new schemes for the insurance against war risks of those classes of movable goods not at present insurable are provided for. One of these—the " business scheme "—is to include movable plant and machinery, office furniture, &c., used for the purpose of a business. The Bill is a complicated measure and is being carefully investigated by the Council, and will also be considered by the Executive Committee of the Conjoint Conference, not only in relation to the promised legislation, but to such of it as will apply to undertakings as soon as it becomes operative.

Evacuation

Another matter of common concern to the Public Utilities discussed by the Executive Committee of the Conference was the position of undertakings in the evacuation areas created under the Defence (Evacuated Areas) Order, 1940. In many cases a large proportion of the inhabitants of those areas has left them, thus reducing the number of consumers of gas, water, and electricity, and those who are left benefit by a moratorium under certain circumstances. On the other hand, not only must public utilities continue to carry out their statutory obligations to supply, but they are not relieved from the obligation to pay for the coal and other raw materials which they require to carry on. Such a state of affairs necessarily places many of them in a difficult position, particularly company undertakings. Various schemes for affording help have been discussed by the Executive Committee, but a satisfactory solution has not yet been arrived at. It has to be remembered that the public utilities are not the only sufferers from loss of business in

the evacuation areas. Many shopkeepers, hotel and boarding-house keepers and other have suffered seriously and in many cases have had to close down, while more recently businesses in other areas have been brought to a standstill owing to enemy action. The loss suffered in the aggregate must amount to a very high figure, and it is more than doubtful if the Government will be prepared to shoulder the burden.

Income Tax

In addition to the matters already mentioned which have arisen as the result of the war, the Council had to deal with a great many others of a more detailed nature. Developments in Civil Defence plans, the use of the Home Guard for the protection of gas-works and war risks insurance in regard to which several Orders have been issued are examples which could be multiplied many times.

Apart from the action taken in regard to the Rating Act already referred to, only rating matters of detail affecting individual undertakings have come up for consideration. Discussions begun before the war started, regarding amendment of the law dealing with rating, have not, of course, been resumed, as at present there is no immediate prospect of general legislation. Useful progress has, however, been made in the course of negotiations with the Board of Inland Revenue regarding certain Income Tax questions of importance to gas undertakings. Thus, the application to gas-works of Section 15 of the Finance Act, 1937, which deals with depreciation allowances in respect of buildings, was the subject of an agreement reached after much discussion and set out in a Memorandum which was circulated both to Income Tax Collectors throughout the country, and to all Technical Representatives, members of the National Gas Council.

Agreement was also reached on the question of expenditure incurred in connexion with public lighting services. The expenditure on services is to be allowed as an admissible deduction as and when incurred, while lamp columns, lamps, clock controllers, and gear are to be the subject of a specified wear and tear allowance. Negotiations with the Inland Revenue Authorities regarding other Income Tax questions are proceeding satisfactorily.

Having regard to a variety of circumstances, and especially to the desire of members of the Council to be absent from their undertakings as little as possible under present conditions, the number of meetings of the Central Executive Board and of its Committees has been kept as low as possible, but constant touch has been maintained with members by means of correspondence and by making the Monthly Reports as full as possible. On the other hand, there has been no diminition in the volume of the Council's work, questions arising out of the war having more than outweighed those which are necessarily in abeyance. Every endeavour has been made to further the national war effort by all possible means at the Council's command, and that policy will be strenuously maintained until victory is achieved.

The Industry in Scotland

War brought many problems to the Gas Industry, but as has been the case elsewhere, the Industry in Scotland has tackled its special ones with energy and courage. The blackout, evacuation, &c., with their attendant social upheaval, while not affecting undertakings to such an extent as those in certain areas in the South, did involve many in a considerable reduction in the make of gas. Many undertakings, however, with the progressive momentum of the Nation's war effort, have shown commendable enterprise in the recovery of this load, and in the industrial field alone there are now to be recorded in several instances large increases in output. In other cases, undertakings have given wherever possible supplies of gas to the Services, and have co-operated whole-heartedly in their service to canteens, welfare centres, and other schemes.

While the outbreak of war had the initial effect of retarding general sales activities, it can be said that for the most part the Industry in Scotland was sensible to the need for continued sales promotion, and this has been reflected in large increases in sales of appliances recorded in recent financial reports. It has to be expected, however, that the restricted production of appliances which is now enforced in the interests of national economy will have an effect on future sales. Another aspect of sales activities has been the opening of new showrooms by several undertakings since the outbreak of war.

On the other side of the picture the burden of rising costs has been a heavy one, in which coal is a considerable item. To a certain extent the increases in coal costs have been offset by increases in coke prices, and in the latter connection it is gratifying to be able to report that the efforts to form a fully representative Regional Coke Association in Scotland are now meeting with some success. Membership of the Association is steadily increasing, and it is hoped that at an early date the Association will be in a position to operate.

So many of Scotland's war problems are similar to those covered by our general review that it is not intended that this section should be other than a brief and generalized one ; but it may serve to show that the Gas Industry in Scotland has not been inactive or slow to respond to the needs of the Nation. While it is true to say that so far Scotland has been fortunate is escaping the " blitz " conditions of many areas in the South the Industry there has endeavoured to make the most of its comparative aerial passivity and to devote its maximum energy and war potential to the successful prosecution of the national effort.

The Institution of Gas Engineers

The Institution has continued during the past year to discharge regularly its professional, technical, and educational functions, in spite of difficulties arising from wartime conditions and the necessity for a drastic curtailment of the number of meetings of its Council and Committees. Many special problems have been dealt with and matters of immediate urgency have been handled by the Emergency Panel of the Council.

It was with much regret that, owing to the sudden change in the international situation in May, the Council felt it necessary to cancel even the restricted form of the 77th Annual General Meeting which had been planned. The Council, however, decided, in accordance with the By-Laws, to hold the ballot, as the result of which 16 Honorary Members, 4 Members, 33 Associate Members, and 3 Associates were elected.

It was also decided to circulate the 77th Annual Report of the Council, the Presidential Address, and the other Papers which would have been presented and discussed at the Meeting. It was gratifying to receive a number of written contributions to the " discussion " which were replied to by the respective Authors. The same procedure was also adopted with regard to the Autumn Research Meeting and a number of publications were published and written comments on them have been invited.

Institution Medals, which would normally have been presented at the Annual General Meeting, were awarded as follows : The Gold Medal to Walter Grogono and T. Campbell Finlayson ; the Silver Medal to Norman Hudson ; the Bronze Medal to F. Cartledge ; the H. E. Jones London Medal to Cyril M. Croft ; and the Charles Hunt Memorial Medal in the Diploma Examination in Gas Engineering (Manufacture) to T. S. Ricketts.

The membership of the Institution has again increased, and is now 1,782 compared with 1,773 at this time last year.

The Institution has lost by death one Honorary Member and 17 members, including three serving members of the Council—C. Valon Bennett (Rochester), A. Kellock (Airdrie), and W. W. Townsend (Colchester). Mr. C. Valon Bennett was President of the Institution in 1934–35.

In the continuing state of war it has been found that strict compliance with certain of the by-laws would not always be in the best interests of the Institution and its members. Permission has, therefore, been obtained from the Lord President of the Privy Council, in accordance with the provisions of the Chartered and Other Bodies (Temporary Provisions) Act, 1939, to modify the by-laws in one or two respects, and particularly with reference to the holding of the Annual General Meeting and the Ballot for the election of Officers and Members of the Council. The

Council deemed it wise to avail itself of these modifications in the by-laws during the current year and postponed the holding of the 77th Annual General Meeting. It also postponed the Scrutiny of the Ballot for the Election of Officers and Members of the Council. The present Officers and Council thus remain in office for a further period not extending beyond June, 1941.

Research

The year has been marked by the publication of the first Annual Report of the Council of the Gas Research Board (referred to below), dealing with research investigations undertaken on behalf of the Institution and with the special wartime activities of the Board. The work of the Technical Committees of the Institution, which was formerly reviewed in the Report of the Research Executive Committee, will in future be co-ordinated by the Chairmen's Technical Committee, which was appointed by the Council of the Institution and consists of the Chairmen of Technical Committees of the Institution of Gas Engineers and of the Council and Research Committees of the Gas Research Board. This Committee will ensure close contact between the Technical Committees and the research work of the Gas Research Board. Among the activities of the Technical Committees, particular attention may be drawn to two important subjects investigated respectively by the Gas-Works Safety Rules Committee and the Pipes Committee concerning the freezing of the water in tanks of spirally guided holders and the fracture of gas mains during periods of low temperature.

The Institution has continued to co-operate with many Government Departments, and through the expert advice of its Technical Committees has assisted in the National War Effort. Problems relating, *inter alia*, to Air Raid Precautions, the results of subsequent experience in putting these into operation, distribution problems, particularly those relating to the use of special tubing, wartime street lighting and factory lighting problems, and matters relating to by-product recovery, have been continually reviewed by the respective Committees. Fuller reference to these subjects is contained in the 1st Report of the Chairmen's Technical Committee, 1939–40.

A Library Committee has been appointed by the Council, and the binding of the technical periodicals which are preserved in the Library has been brought up to date. A notable accession to the Library has been the gift by Mr. D. M. Henshaw (Huddersfield) of the volume of the *Gas Gazette* for 1847. It is believed that this volume was originally the property of Thomas Barlow, Founder of the "GAS JOURNAL" in 1849, and that it came into the possession of William King, Grandfather of Clifford and Rupert King, now respectively Managing Director and Editor. William King was Publisher (at 11, Bolt Court) for Barlow, whose office was in Victoria. The *Gas Gazette* was first published in 1847, but was soon merged into the *Journal of Gas Lighting*—now the "GAS JOURNAL."

Education

The Gas Education Committee has, during the past year, suffered the loss by death of its first Chairman, Sir Francis Goodenough, who remained its Chairman for 15 years. Sir Francis inaugurated the Education Scheme, of which it was written in his Obituary Notice, "he left behind an organization worthy of the work it is designed to meet."

The number of candidates for the Institution's Examinations has been much reduced owing to wartime conditions, and students have, in many cases, pursued their studies under considerable difficulties. Their perseverance in the prevailing conditions is deserving of praise, and is a matter of gratification to the Committee. The Examination results are evidence of the success they have achieved.

There were 277 candidates for the Examinations in Gas Engineering (Manufacture) and (Supply), of whom 67.5% passed ; 47 obtained first-class passes, 8 with distinction. There were 17 candidates for the Diploma Examination, 16 for the examination in Gas Engineering (Manufacture), and one for Gas Engineering (Supply). Twelve candidates passed in the examination for the Diploma in Gas Engineering (Manufacture), one of whom gained a distinction.

The Diploma Theses of the successful candidates have been deposited in the Library of the Institution, and summaries of the Theses were published in the 17th Report of the Gas Education Committee.

In view of the prevailing conditions, arrangements have been in progress and are continuing, with the concurrence of the Committee, between Principals of Colleges where approved courses in Gas Engineering are conducted, and H.M. Inspectors of the Board of Education for modification, where necessary, of the number of hours of instruction, and revision of the timetable. It has been decided to defer the dates of the Examinations in 1941, in order to give students a longer time for preparation. The examination in Gas Engineering (Manufacture) has, therefore, been arranged for June 14, 1941, and Gas Engineering (Supply) for June 21, 1941.

The Gas Research Board

The Council of the Gas Research Board has published its first Annual Report, giving an outline of the inception, objects, and organization of the Board, and an account of the special investigations and researches carried out under its direction.

The formalities of incorporation of the Board as a Company Limited by Guarantee under the Companies Act, 1929, are now virtually completed, and it is hoped to publish the Memorandum and Articles of Association early in 1941. It may be noted, *inter alia*, that arrangements have been made between the Institution and the Board whereby members of the Gas Industry will continue to have the opportunity of discussing the Reports of research investigations carried out by the Board at the Autumn Research Meetings of the Institution.

Although the Autumn Research Meeting could not be held this year, the Gas Research Board published its first two Research Reports—namely, the 31st Report of the Refractory Materials Joint Committee (Communication No. 2), and a Report on Noises of Gas Burners (Communication No. 3).

No Reports of the investigations of complete gasification and methane synthesis, which are being conducted at Leeds University, will be published for the present, but the work of the Research Chemists there has been proceeding steadily and with encouraging results.

Following so closely upon the publication in the "JOURNAL" of the first Annual Report of the Council of the Board, it is perhaps unnecessary to refer again in detail to the various other investigations which have been engaging the attention of the Council during the past year. The Council is actively pursuing the objects of the Board, which are defined, broadly, as "to promote, assist and support research and other scientific work in connexion with the gas trade or industry and other trades or industries allied therewith or accessory thereto." It will also function more and more as a clearing-house of research information relating to such industries. In addition the Board has been able to assist Government Departments in many directions connected with the war.

As soon as the formalities of the incorporation of the Board are completed, the Council will consider applications for membership of the Board, as to which full particulars will be published in the near future.

The B.C.G.A.

In wartime, as in times of peace, the Association has a duty to its members to educate and guide the public in the most profitable ways of using their supplies of gas without waste, and thus not only to maintain, but to extend the use of gas. This policy must of necessity be adapted to wartime conditions which have presented an entirely new problem to the B.C.G.A. The Association has endeavoured to meet this problem, not so much through the medium of national advertising, but in other ways such as the preparation of material for members' local use ; the production of topical films ; the circulation of accurate information to the Press on matters connected with the utilization

of gas in wartime ; and by acting as a liaison between Government Departments and gas undertakings.

An examination in some detail of the various aspects of the Association's activities during the past year will show how much has been achieved in these directions, and how the Association has moulded its policy to meet the changing conditions of the war. In this connexion it must be mentioned that, during the year, an agreement was reached between the national organizations representing gas and electricity, whereby competitive selling methods were curtailed for the duration of the war. In all its work the Association has borne this in mind.

At the beginning of the war the Association made contact with various Government Departments and has been working closely with a number of them. For example, it has acted in conjunction with the Ministry of Information in the Ministry's scheme for the circulation of documentary films and " prestige " window displays.

The Ministry of Supply is another Government Department with which the B.C.G.A. has usefully co-operated. The Association assisted in arranging a Press visit last spring to Beckton Gas Works sponsored by the Ministry. The Minister himself took part in the visit, as a result of which the vast contribution by the Gas Industry to the country's war effort was made known to the representatives of many important newspapers and technical journals, and through their columns to the public.

With the Ministry of Food the Association has been working very closely in connexion with the National Food Campaign. When the Gas Industry was asked by the Minister of Food to assist his efforts to educate the public in wartime feeding and catering, the Association became the natural medium through which the Ministry's policy could be interpreted to gas undertakings. The Industry's co-operation in the Campaign was made known to the Press at a wartime luncheon last April, at which Lord Woolton was the guest of honour. Since that date the B.C.G.A. Home Service Department has acted as an information bureau, regularly keeping members acquainted with the latest information put out by the Ministry, and a number of helpful booklets on food problems have been issued by the Association with the Ministry's approval. These include " Your Food and Health in Wartime " (a reprint of a broadcast by Sir John Boyd Orr—nearly half-a-million copies have been distributed), " Rational Rationing " (over a quarter of a million copies), two editions of a cookery book, " Simple Dishes for Wartime," and other menu leaflets. There was, too, the issue, in conjunction with a London publisher, of "A Kitchen Goes to War," a novel idea in cookery books, of which 50,000 copies were distributed, with the result that the Red Cross (for which a royalty on each copy sold was set aside) benefited to the extent of £100.

The B.C.G.A. is represented on the Ministry's Consultative Committee.

New Gas Films

The Ministry of Food is also making good use of the Association's films dealing with food problems. Three new wartime " shorts " dealing respectively with casserole cookery, green vegetables, and cheese have been produced by the Gas Industry, and presented to the Ministry ; these and some of the pre-war gas films are included in the Ministry's film library for free loan to schools, clubs, and other bodies. The Association's own library is being widely used by borrowers, varying from elementary and secondary schools to military hospitals, and gas films are now permanently in the libraries of many educational associations.

A fourth wartime film produced by the Association is " It Comes from Coal "—an admirable pictorial explanation of the way in which British science is extracting new products from coal.

Successful pre-views of these films have been held in London and by the B.C.G.A.'s Scottish Management Committee in various cities in Scotland, and audiences totalling many thousands have already enjoyed them in many parts of Great Britain. It says much for their " entertainment value " as well as their educative message that commercial cinemas are taking an interest in the new gas films.

Services to Members

During the year the B.C.G.A. has maintained its usual services to its members. In the earlier part of 1940 two national advertising campaigns were carried out emphasizing the " prestige " story of gas in relation to our war effort. These advertisements were supported by an illustrated broadsheet, " Mr. Therm Fires the Guns," of which nearly 400,000 copies were distributed, by editorial articles, window displays, a 16-sheet poster, and local advertising by individual gas undertakings. There is no doubt that the campaign did much to give the public a new idea of the Industry's services to the community.

Other B.C.G.A. publications during the year included a reprint from the Ministry of Information's news-sheet " Noteworthy," entitled " War Supplies from Coal," issues of "A Thousand and One Uses for Gas," dealing with the feeding of children in reception areas, gas in A.R.P. centres, and canteens for the Forces and the factories ; a gas poker leaflet, " Save Wood and Paper," which was supported by other publicity material, to enable undertakings to conduct a small campaign on the gas poker's help in waste paper salvage ; luminous badges, economy envelope labels, ration book cases, advertisement envelopes and goodwill material. Undertakings have made good use of all this material.

Members have been supplied with ideas for local advertisements and special advertisements, leaflets, &c., have been prepared at the request of individual members.

With the cessation of national advertising, more attention has been given to the editorial columns of the Press, and the many references to gas during the year in articles and paragraphs have shown that newspapers and journals realize the importance of the Industry's activities.

The B.C.G.A. studio has had a busy year. A number of members have participated in its regular service of monthly window displays and posters ; and a number of special displays have been designed for undertakings. The studio has also supplied a large number of double-crown posters, showcards, window strips, and other material, including such wartime requirements as anti-splinter tape.

Wartime lectures with lantern-slides have been prepared for members' use.

Two Press conferences to make known facilities for the use of low-pressure gas as a substitute for petrol for motor vehicles have been followed up by the issue of a list of gas-filling stations available to road users. This is another direction in which the Association's work carries a dual benefit—to the Industry itself and to the Government which has shown itself anxious to promote the use of alternative fuels during the war.

The S.B.G.I.

In common with many other societies and associations it was decided, after consultation with the members, to ask the Council to continue in office for the ensuing year. The President, Sir Francis Joseph, very kindly consented to serve for a further term and other elected officers readily followed his example. When war broke out the conduct of the Society's affairs was entrusted to an Emergency Committee. This arrangement has worked very well and smoothly and will be continued.

The Society, in common with the other national organizations in the Gas Industry, has found many of its peace-time activities necessarily curtailed or suspended, and has been brought face to face with a large number of new problems. It is, however, proving its capacity to adapt itself to the changing circumstances of the times, and on the broad view it can probably be truly said that in consequence its usefulness has increased. Moreover, the Government seem to be implementing their declared policy of working through the trade organizations of the country in their contacts with Industry, and along this path it seems more likely that in the months, perhaps the years, ahead will lie the main activities of bodies such as the S.B.G.I.

The temper of industry to-day undoubtedly is to accept in good heart the increasing measure of control which is being exercised on it, but the process of adaptation to a new set of circumstances brings many problems in its train. In the case

of the Society's members, they have on the one hand the obligation to do their utmost for the Industry which they serve, and on the other hand many of them have had calls made on their productive capacity for the direct war effort to which it has been a matter of national urgency for them to accede. The problem has, therefore, presented itself to many of them whether in fact there is sufficient appreciation of the importance of the Gas Industry to the Nation in wartime, and whether in fact in the exercise of the control of raw materials and of skilled labour a sufficiently high priority is accorded to Gas Industry business. It is certain that without that recognition no amount of goodwill on the part of the contractors and manufacturers will directly solve the problem, since the extent to which their activities are controlled in many cases virtually removes their freedom of choice. Admittedly, should it happen that there were to be a total disruption of gas supply in an area where it was of the first importance in keeping a whole range of factories engaged on urgent Government orders in production at all, and of hardly less importance in maintaining essential services in the homes of those who work in the factories, the priority attaching to the restitution of that supply would be obvious. It seems, however, that in the wide view which has now to be taken of the prosecution of the war and the maintenance of vital services, there is room for a clearer definition of the national importance of the Gas Industry, and for the translation of that definition into a more ready access to the means of production.

Supply of Materials

In any consideration of the Society's affairs in present circumstances, the question of the supply of materials must necessarily loom large. The scheme for the Distribution of Steel Supplies inaugurated by the Ministry of Supply in the spring emerged successfully from its trial period, and having more recently been brought up-to-date in the light of experience, is now generally accepted as a practical way of assuring that the best use is made of the national steel supplies. It will, we think, be very generally admitted that such control as has been exercised on the Gas Industry through the operation of the Scheme has been wisely exercised, and that something more than impersonal consideration has been given to the needs of the Industry in its administration. The contractors and manufacturers have certainly found they have always ready access to the Administration and that their needs and circumstances have been given sympathetic consideration. Access to other materials has been controlled in no small measure by the prior requirements of the Service Departments, but every effort has been made to keep these supplies in line with supplies of steel and thus to ensure as far as possible a reasonable economy of production in the works. The process of the control of raw materials seems to have inherent in it something of the same set of conditions which give rise in the national economy to what is known as a vicious spiral where inflationary influences are present, and the further along the path of control industry goes, the greater are the potentialities for the exercise of further control. While it is clearly beyond question that in present circumstances raw materials must be rationed, it is equally clear that the widest possible discretion should be left with individual industries to allocate those materials internally to the best advantage, not only of their consuming but also of their productive capacity. This, in the main, has been so far achieved, but that control should be the servant and not the master of industry is of vital importance for the future.

The facilities which the Society offers have enabled contracting and manufacturing firms concerned to confer together and jointly to confer with Government Departments and other national organizations in the Industry on many occasions during the past year to the general advantage. For instance, there was set up by the Secretary for Mines a Committee " to consider and examine the possibility of increasing the amounts of liquid products obtained hy high-temperature carbonization in gas works and coke ovens, and the most advantageous means of utilizing such products in wartime." This Committee submitted a report urging the maximum possible recovery of benzole, and all statutory gas undertakings and all recovery coke ovens were asked to co-operate. It was thought that one factor which might be expected to assist in the increased production of benzole would be some measure of standardization of benzole recovery plants, and the Society was asked to arrange for the makers of benzole plants to examine this matter collectively and to confer with the Advisory Committee which was set up. The investigation showed that it was in the smaller range of sizes that some degree of standardization was most desirable, and in the result three sizes of the smaller units are now available of designs approved by the Advisory Committee. Moreover, representatives of the makers and of the Advisory Committee are continuing to keep in close touch with each other, certainly to the advantage of the makers, and it is hoped also to the benefit of the Advisory Committee.

Another example of useful co-operation that might be mentioned is a case where urgent work of a specialized nature had to be carried out with the greatest possible expedition in the national interest. To meet these special circumstances, the Society was asked to mobilize the capacity at the disposal of its members and to place it at the call of the gas undertakings in question. In a very short time provision had been made for the work to be allocated among responsible and fully qualified contracting firms, and, moreover, a reserve had been built up on which immediate further calls for assistance could be made. These two examples which have been cited are of particular interest to the Industry in a number of ways, but perhaps notably because they are logical developments from the spirit of co-operation which has been sedulously cultivated within the Gas Industry over the last few years, and certainly with no thought of preparation for the state of affairs in which it has been necessary to put that co-operation to the test. In both instances the necessary plans have been made and executed with a minimum of formality and a maximum of understanding of the circumstances with which those concerned on both sides were faced.

The Purchase Tax

A major development which the Society has had to face during the year has been the Purchase Tax. In the form in which is was originally proposed, there seemed a grave danger that it might result in a levy on a very wide range of production with effects the consideration of which presumably led to the introduction of a much more circumscribed measure. The Society made representations regarding the Tax in its original form, and in its modified form the Society has been concerned primarily to secure clarification and simplification of procedure in the incidence of the Tax. In general, the Tax covers a wide range of goods in domestic use, and so far as the Gas Industry is concerned, these include primarily appliances for heating, cooking, and water heating, and lighting fittings. The Tax is essentially a consumer's tax, levied at the wholesale-retail stage. In the main the Society believes that the negotiations which it has conducted with the Custom House, whose attitude has at all times been most helpful, have led to agreement both on points of principle and of detail which will cause a minimum of disturbance to the trading relationships between manufacturers and gas undertakings. In the result, the Tax means increased prices to the user, but it is doubtful if it will in itself cause much further diminution in Gas Industry business in domestic appliances, which was already reduced drastically as the result of the control of raw materials and the incidence of the provisions of the Limitation of Supplies Orders.

Export Trade

In reviewing a year such as 1940, a lengthy chronicle could be given of detailed activities, since it has been a very busy year for the Society, but following the lines so far taken of referring only to a few important and typical activities, there remains one major development to record, namely, the formation of the Gas and Coke Oven Industries Export Group. In outlining the aims and plan of work of the Export Council, the President of the Board of Trade said: " Never have the maintenance and

increase of export trade been so vital to the very existence of our State and people ; never have traders in this country had a more urgent duty to perform or a task the success of which is more certain to ensure the future of themselves and of their country." The first step taken by the Board of Trade was to convene in March a meeting of Trade Associations and Chambers of Commerce, to outline to them the proposal for the formation of autonomous Export Groups, and to enlist their support. The Society responded promptly and application was made to the Export Council for the formation of the Gas and Coke Oven Industries Export Group, which was divided into three Sub-Groups covering respectively Gas and Coke Making Equipment, Gas Appliances, and Gas Meters. Membership of the Group and its Sub-Groups is not confined to S.B.G.I. members, though of some seventy-five firms engaged in export trade which have joined the Group, over 90% are S.B.G.I. members. The initial benefits resulting from the Group being in the first list of those formed have not been lost, and quarter by quarter the Group has made its applications for raw materials and for timber for export packing to time, and has had the full advantage, in consequence, of receiving its allocation in the first batch in each case. The loss of nearly every European market very shortly after the formation of the Export Group has naturally affected adversely its turnover, though there are clearly possibilities of securing increased business in the world markets still open as the result of the elimination of competing European countries. Raw material returns and allocations are handled by the Secretary of the Main Group for the members of the three Sub-Groups under authority of the Industrial Supplies Department, Board of Trade, and the provision made at the outset for the Secretary of the S.B.G.I. to be Secretary of the Export Group has worked well in practice. Each Sub-Group has its own Chairman and Secretary, and the Sub-Groups are developing a sense of common interest in promoting export trade. It would be premature to forecast the result of the first year's working of the Group, and very possibly the Returns of Export Business done will be reserved for the information of the Export Council and the Board of Trade ; but to those who without knowledge regard such Trade as being of negligible importance, the business already done would probably be surprising. The initiative taken by the Society in forming the Gas and Coke Oven Industries Export Group was fully justified at the time, and there is sound reason for thinking that the results achieved will justify its continued operation.

Technical Developments

In regard to technical developments during the year one has necessarily to approach the subject to an extent with " sealed lips." Though one cannot write a great deal about them, it would be quite false to assume that the Industry has stagnated in the matter of research. Far from it. Wartime has brought new and immediate problems which have been or are being tackled ; it has also imposed conditions of censorship, some of which are understandable and others of which are not so easy to comprehend. The work of the Joint Research Committee on the complete gasification of coal has been continued on substantially the same lines as those laid down when this work was commenced, though special attention has been directed to the possibilities of using methane as a wartime fuel—the possibility of devising a process which could be put into operation quickly. This modification, however, has not meant any serious departure from the lines originally planned, and the possibilities and limitations of catalysts in the synthesis of methane have been and are being studied in the closest co-operation with the Fuel Research Board. It has not been considered in the national interest to publish detailed results of the investigation, but the difficulties which hitherto hindered the development of this process are becoming far more clearly understood and controllable. The difficulties no longer appear as the formidable obstacles which they have been hitherto. The production of methane by the gasification of coal in hydrogen under pressure has not lost its interest, but circumstances arising from the war have made it impossible so far to proceed with the large scale experiments which had been planned in co-operation with the Fuel Research Board. There is, however, some possibility that other arrangements for the continuation of this work may be available.

Among developments made during the year, or reported during the year and recorded in our columns, six main subjects at once spring to mind. These are : (1) Street and factory lighting and fundamental research on luminosity ; (2) the use of gas and coke for motor transport ; (3) the application of luminous as distinct from aerated flames ; (4) the removal of sulphur compounds from gas ; (5) the question of deterioration of coal on storage ; and (6) inert gas applications. Let us take a glance at these. It was in January that the British Standards Institution issued the Specification for Street Lighting under Wartime Conditions. This specification was drafted by a Joint Committee of the Ministry of Home Security and of the Illuminating Engineering Society, and its publication was the culmination of many weeks of intensive research and experiment carried out with the wholehearted co-operation of the gas and electrical interests and the Government Departments concerned. To meet practically all possible conditions of mounting height and spacing three candle-power distributions were standardized and the manufacturers of the fittings were given a free hand to adopt any form of design they liked, provided that the light emitted was of an intensity and in a direction such that the polar curve of light distribution fell within the limits laid down in the Specification. In August the Ministry of Labour and National Service issued the Fifth Report of the Departmental Committee on Lighting in Factories. Under wartime conditions work has to be done at higher pressure than in peacetime, and much greater strain is imposed on the worker. Also, due to the prevalence of night work and overtime, the time spent under artificial light is far longer. In view of these factors the Departmental Committee came to the conclusion that in factories generally a minimum of 6 foot-candles at 3 ft. above floor level should be attained, without prejudice to any additional illumination required by the nature of the work. In regard to interior parts over which persons employed are liable to pass, the illumination recommended was 0.5 foot-candle.

We have referred to fundamental research on lighting. In April we published an abstract of a Paper by Messrs. Minchin, Densham, and Wright, of the Gas Light & Coke Company, to the Illuminating Engineering Society. Gas lighting it was pointed out—that is, gas lighting as understood and practised —is a thermal effect. Developments recently made in gas burners are likely to result, through higher aeration and consequently higher flame temperature, in increased gaslighting efficiency, but on the purely thermal radiation theory of gas lighting there appears little prospect of ever increasing efficiency by more than, say, 100%—an amount which would still leave the energy efficiency exceedingly low. The present figure for a low-pressure lamp is about 0.2%. But must reliance be placed solely on thermal radiation ? In 1842, as the Authors mentioned in the Paper, Balmain, who prepared boron nitride, discovered that it showed an " elegant green phosphorescence " in the outside fringe of a flame. At the meeting of the Illuminating Engineering Society they repeated the experiment, showing how, with a specimen treated with boron nitride, the greenish-blue glow starts first as the specimen heats up. When it has become quite bright the red of normal incandescence begins to show itself, and only when the substance has reached a bright red heat is the green colour masked. This luminescence, it would seem then, is not a thermal effect, but a chemical phenomenon. Investigators have recorded as high a value as 40% for the chemi-luminescence resulting from the union of sodium and iodine under special conditions. " Once," stated the Authors, " the phenomenon of the incandescent mantle is established as being of the nature of luminescent the barriers are down, and there is no longer any theoretical reason why lighting efficiency should not be advanced ten or a hundredfold."

Alternative Fuels for Motor Transport

Now let us turn to the use of gas and coke for motor transport. The standardization of the filling connexion for fabric gasbags has had attention, and developments have shown that simple conversion of petrol engines to town gas at low pressure can be most successful, and that the limitations imposed do not seriously

affect the value of gas as an alternative fuel. The limited mileage does not permit of touring, but for town work the operating radius is adequate, especially as the number of gas-filling stations is rapidly increasing. In February we summarized the report of the Committee on the Emergency Conversion of Motor Vehicles to Producer Gas. Specifications have been published laying down the characteristics of fuels which can be expected to work satisfactorily in producer gas units of approved types, and work has been actively pursued in the production of reactive cokes by alkali activation. An important communication in this connexion was that of Messrs. Thomas and Askey to the Institution last June.

We have had stimulating articles on the application of luminous flames to gas fires and cookers, and emphasis has been laid, quite rightly, on the solid hotplate. One of the findings reported in Institution Communication No. 223, which gave the results of work on the combustion characteristics of town gas and its constituents in the laboratories of the South Metropolitan Gas Company, was that in order to give flames of the same characteristics it will with bunsen burners be necessary not only to alter the size of gas orifice for different gases, but also to adjust the supply of primary air. Burners will be required to be fitted with provision for the adjustment of both gas and air. Now this, Mr. Chandler has pointed out in an article published in the "JOURNAL" in January, is an onerous business ; and he went on to say, "entirely without the aid of such awkward devices . . . the non-aerated burner gives a flame of inherently greater flexibility than the bunsen flame." He added that the need for some flexibility in gas quality to enable manufacture to be carried out on economical lines would be met by the use of the more flexible non-aerated burner. That statement was made prior to the bombing of our country ; after the slight aerial warfare we have as yet experienced, we think that his statement holds. It is true to-day that it is desirable that experimental work should be devoted to the design of appliances intended, from the start, to embody luminous flame burners. Time and money spent on this work in the coming year will be well spent—irrespective of the war.

Sulphur Removal

We come to the removal of sulphur from town gas. Since the last War a great deal of investigation and experiment has been conducted both into making the best use of oxide purification plants and into alternative methods of ridding gas of sulphuretted hydrogen. This work is going to stand the Industry in good stead and relieve apprehensions as to the future. Necessarily, available knowledge will have to be reviewed and studied and possible developments and action clearly envisaged. In January of this year the experiences of the Commercial Gas Company with burnt oxide were recounted in our columns. This Company has for many years used this material almost exclusively for sulphuretted hydrogen removal with "reasonably satisfactory results."

Conditions of to-day bring sharp definition to two aspects of the purification problem—(*a*) purification with minimum expenditure on iron oxide, when the recovery of sulphur is not a major consideration ; and (*b*) purification by methods in which recovery of sulphur as such assumes great importance. In wartime both aspects are of more than ordinary interest.

In regard to group (*b*), there is as an example the Thylox process, in which sulphur is produced in three forms, and there are the various processes based on ammonia washing which, as far as the Gas Industry is concerned, would appear to be best adapted to a partial removal of sulphuretted hydrogen, leaving final purification to existing oxide boxes. And there are other methods of sulphur recovery based on higher working temperatures and catalysis. Moreover, should maximum sulphur recovery from gas be deemed necessary under wartime conditions, the field must be viewed to include also coke oven gas used for heating the ovens and for steel heating furnaces, in which respect partial recovery by processes other than oxide purification would be attractive. For economic and other reasons, such as technical supervision of plant and so on, and especially because of the necessity of removing all the sulphuretted hydrogen from gas supplied to the district, liquid processes have not replaced in the Gas Industry the well-tried dry purification method by oxide.

Which brings us to our final note in this section on technical developments, which is concerned with deterioration of coal on storage and the unrelated subject of the application of inert gas. In regard to the former problem a Paper was given in April to the North British Association of Gas Managers. It was published in full in the "GAS JOURNAL." The results of investigations on the weathering of coal point to the desirability of stocking definite types. If appropriate types are selected small difficulties will be experienced. Low-caking coals do not "weather" well over prolonged periods. Changes occur quickly when such coals are stored, and their net effect when these coals are carbonized (semi-gasified) in continuous vertical retorts is disastrous to the economics of gaseous therm production. As for inert gas applications, as long ago as 1937 one of the Institution Research Communications described a simple method of purging gasholders with inert gas—a method ensuring 100% safety in clearing a holder or re-charging it with gas. The application of the method has since grown and has extended to purposes other than the purging of holders. For the smaller undertakings machines have been developed which are now available on hire. The method represented an important advance in gas-works technique. The machine described in that Communication was evolved in America. During the year we have learned from the American Gas Association of further application of an inert gas generator—a new type of apparatus—to certain processes in the manufacture of paint or varnish. The method is now being used with very satisfactory results in three of the largest paint and varnish works in the United States. The inert gas is delivered at low cost and in large volume for "blowing" synthetic varnishes during manufacture, for excluding air from contact with heated batches of varnish or oil, for eliminating skinning in plant storage, and for preventing the accumulation of gummy layers of oxidized paints or varnishes. We have been informed that the cost of providing atmosphere protection in this way is only about one-fifth of the cost previously incurred in supplying bottled carbon dioxide for the same operations.

Coke

The position of the coke market during the past year has, generally speaking, been difficult—due to a variety of causes which will be within the knowledge of most of those engaged in the Industry. One of the principal troubles has been the fact that, while in certain producing areas there has been ample supply, other parts of the country have suffered shortages by reason of other calls on transport services. Other difficulties have been consequent upon a lower make of coal gas in some districts, together with a higher percentage of water gas, while the blackout has imposed certain restrictions upon carbonizing operations, necessitating longer carbonizing periods on some plants during the night, which affects not only the make, but also the quality. The Coking Industry has not failed to make the position abundantly clear to the Mines Department, and every effort has been made by the Industry itself to bring about the import of coke into areas of short supply.

The Industry has been fully conscious of its responsibilities with regard to educating the public in these times on the economical use of coke. Early in the summer the services of the Coke Associations were placed at the disposal of the Government with a view to bringing about greater economy in fuel utilization. As a consequence, an agreement was reached between the gas coke, hard coke, anthracite and steam coal producers, the outcome of which was the issue, with the approval of the Government, of a series of pamphlets dealing with economy in the use of fuel in domestic, central heating, and steam-raising boilers. In addition to this series, three technical pamphlets were published treating the same subject from the point of view of the service engineer and those concerned with the supply of fuel to the classes of consumer enumerated. The cost of this campaign was defrayed entirely by the industries concerned, and, in all, something like two million pamphlets were distributed throughout the country. Coincident with these difficulties the demand for coke has probably been greater than at any

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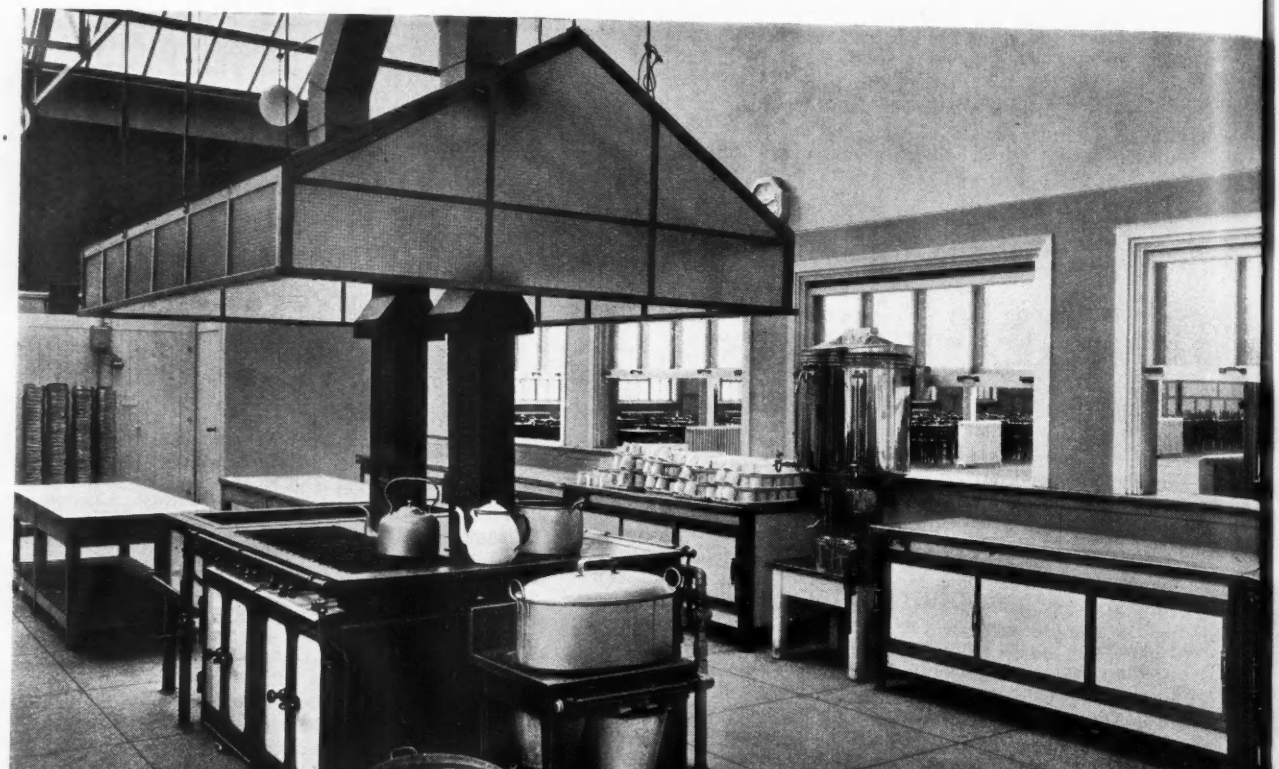


An Industrial Canteen to cater for 750 meals a day

RADIATION LTD.

Radiation

other time in the history of the Industry. Normally, in peace time, there is a healthy annual increment of new business ; but under wartime conditions this has been accentuated for various obvious reasons.

The price of coke has increased substantially since the outbreak of war, primarily because of higher freight charges and the enhanced cost of coal at the pithead. At the same time, stabilization of gas coke prices has been reasonably well maintained. It can be claimed that the coke market generally and the price position are on a more orderly and co-ordinated basis than is the case with any other solid fuel. This is remarkable in view of the large number of people dealing with prices under the aegis of the Government.

It is pleasing to note that the National Federation of Gas Coke Associations has achieved greater strength since the beginning of the war. The problems of the industry are being—and rapidly so—dealt with on a comprehensive national basis. There is room, however, for some improvement in the strength of this national body, certain areas being still outside its embrace. One hundred per cent. representation would considerably enhance its negotiating power and would be of benefit to the industry as a whole, not only during the present difficult times, but during the post-war reconstruction period. It is evident, as we have said before, that the future outlook for the industry must depend upon the effective co-ordination of the gas coke business ; and there is yet too much evidence of neglect in the development and utilization of this important branch of the Gas Industry. The export market, of course, has been practically non-existent during the greater part of the year ; and from the point of view of the shortage in London and other southern areas this may, perhaps, be accounted as fortunate.

With regard to technical developments, the London and Counties Coke Association has been active in promoting the use of coke for various purposes which may be turned to national advantage at the present time. Notable among these is the drying of household refuse for conversion into animal feeding stuffs. Such developments—particularly grass-drying, which has now been proved to be a well-established and scientifically sound process—are capable of great things in connexion with the livestock industry, and merit every possible encouragement on the part of the Government Departments concerned.

By-Products

Turning now to by-products, home prices for sulphate of ammonia have advanced by 48s. per ton over the corresponding prices for 1938–39. Of this amount 39s. 3d. represents ascertained increased costs of manufacture and distribution, and the balance of 8s. 9d. per ton is to be assigned to a fund to cover unforeseen contingencies. Manufacturers of sulphate of ammonia are required to pay 8s. 9d. per ton to the Ministry of Supply in respect of each ton of sulphate of ammonia sold. If there is no further increase in the cost of manufacture, the amount accumulated in the National Fertilizer Charges Fund will be applied to a reduction in the selling price to farmers in the future. Thus, it will be seen that the advance has not been made in respect of ammonia as such, but merely to cover bare increases of manufacturing costs. All gas undertakings are now receiving a substantially increased price for the sulphur of spent oxide, and this increase represents one of the items of the 39s. 3d. per ton in question. The exportation of sulphate of ammonia has been prohibited, and the only market now available is the home market.

Manufacturing costs of sulphate of ammonia continue to advance, because charges for fuel have increased, and because there is less low-grade fuel available in certain areas than formerly. Moreover, tank hire for the conveyance of ammoniacal products has increased substantially, because of delay on the railways.

Mr. Challis, of the Australian Gaslight Company, has made a macroscopic examination of caked ammonium sulphate, and his investigations show that cementation of minute crystals is formed by the absorption and subsequent evaporation of water. The hygroscopic nature of commercial ammonium sulphate is much greater than that of the pure salt. The caking tendency could not be correlated with the percentage of voids. Caked samples contained small and irregular fragile crystals, which were easily broken to fines. This investigator has confirmed what was emphasized in our review last year—namely, that the steam-ammonia stream from the still, and the design and equipment of the saturator, must be such that the incipiently-formed sulphate of ammonia crystals must be maintained in suspension until they grow. Challis suggests that improvement can be effected by the provision of a central vertical tube, with a steam coil at the base, and he remarks that a high steam-ammonia ratio favours the formation of large crystals.

At the request of the Ministry of Supply, and in conjunction with the Liquor Effluents and Ammonia Committee of The Institution of Gas Engineers, a brochure has been published setting out in detail how a simple form of plant to manufacture concentrated gas liquor containing 15% of ammonia by weight can be constructed from materials available at most gas-works, in order to meet the present urgent needs.

It is vitally important that every ounce of ammonia should be recovered and that no undue quantities should be permitted to pass to the purifiers. The Ministry of Supply is not indisposed to render monetary assistance in the erection of plant for the manufacture of concentrated gas liquor. Certain gas undertakings and coke ovens are being invited to manufacture ammonia liquor, which presumably is to be used for the manufacture of nitric acid. The sulphuric acid set free in this way will be made available for meeting the increased demands for this mineral acid. The ammonia liquor required by the Ministry of Supply should comply with the following specification : Ammonia, not less than 25%, chlorine should not exceed 0.01%, CO_2 should not exceed 0.10%, H_2S should not exceed 0.07%. The solution must be free from drops of oil and from surface film oil.

A technical development of considerable importance has been announced during the year. The Norsk-Hydro arrange for burner gases containing SO_2 to react with ammonia in a packed tower, to form ammonium sulphite. Oxidation of this salt is effected in solution in another tower with oxides of nitrogen, presumably arising from an ammonia oxidation plant. The ammonium sulphate solution is evaporated under vacuum by heat exchange from the previous stages. Another process of this kind, where direct combination of sulphur dioxide and ammonia is sought, is one covered by B.P.511,673. It is a method adopted by the I. G. Farbenindustrie A.-G. They seek to oxidize a solution containing ammonia 100 and SO_2 290 grammes/litre, by subjecting it to a vigorous blast of air in a packed tower. The oxidized product, which contains 15 to 20% of the sulphate radicle, is continuously withdrawn and replaced by fresh liquor, and finally treated in an autoclave at 8 to 9 atmospheres at 140°–160° C. Ammonium sulphate solution and sulphur are thus produced, and the removal of the latter can be easily effected by filtration.

The Paper by Messrs. Henshaw and Cooper regarding by-products recovery prepared for the Annual Meeting of The Institution of Gas Engineers is one that calls for careful study. It deals with a number of aspects, particularly concerning various methods for the recovery of ammonia, and gives a perspective of the economic position.

Figures relating to ammonia and ammonium compounds have recently been issued for 1939. They show that the trade in ammonium carbonate and ammonium bicarbonate was reasonably well maintained, the export total for the year being 1,632 tons, worth £39,629. In ammonium chloride the position definitely improved, last year's exports being 5,699 tons, worth £87,962, compared with 4,314 tons in 1938 and 5,745 tons in 1937. Ammonium nitrate exports were also better than last year, at 23,100 tons, worth £243,300. In 1938 the exports of ammonium nitrate were 16,326 tons, and in 1937 only 5,310 tons. The influence of war demands appears to be reflected in the 1939 tonnage. Ammonium sulphate exports, at 286,191 tons, were lower than in 1938 or 1937 but better than in 1935 and 1936. Exports of anhydrous ammonia in 1939 were 15,077 cwt., worth £41,846. Exports of ammonia liquor in 1938 were 11,546 cwt., worth £11,720. The great bulk of the trade was with empire countries. One frequently receives enquiries about the extent of our exports in ammonium products other than sulphate, and it is useful to record the foregoing figures here.

Tar Products

Many problems have arisen during 1940, as a survey of market prices for tar products reveals. Markets have been difficult, particularly in pitch, following the collapse of France. In May last signs were not wanting that prices would stiffen. Indeed, f.o.b. prices increased from 35s. in January to 47s. 6d.–50s. per ton in June. But with the fall of France and Belgium the demand ceased, and tar distillers were perforce compelled to seek fresh means of disposal.

Pitch represents 50 to 60% of a ton of tar, and it is expensive to stack large quantities. Fortunately, Sir Harold Hartley was appointed Honorary Adviser of the Mines Department, to deal with the development of home-produced fuels, and early in December, 1939, an authoritative body was set up " to consider and review in the light of war conditions, the scope for the substitution of imported fuels by home-produced fuels, and to recommend what detailed enquiries should be undertaken with a view to securing the best use of home-produced fuels in war-time." Later in the year Mr. Geoffrey Lloyd, then Secretary for Mines, observed that " a valuable survey has been completed, which shows how our production of tar, creosote, and pitch can take the place of imported fuel oils and bitumen to the extent of some 300,000 tons in the current year."

The manufacture of fuel oils has constituted one means by which pitch can be disposed of, but it was obvious that large quantities would need to be burned at boilers for the generation of steam.

The essential conditions applying to pitch combustion may be summarized thus : (1) The necessity for maintaining the temperature of the pitch above 200° C. ; (2) the use of super-heated steam as an atomizing medium ; (3) the necessity for circulating the molten pitch at a rate in excess of the quantity being used ; (4) the lining of the tubes of Lancashire boilers should be undertaken with a high-quality refractory material ; and (5) the nozzle of the burner should be designed to avoid excessive erosion. Provided the foregoing conditions are observed, there should be no difficulty in rendering the combustion of pitch reasonably foolproof and reliable. In this connexion it is interesting to note that a continuous burner for the combustion of liquid pitch has been developed by the Royal Dutch Shell Company, combining a mechanical atomizer of novel design with a whirl chamber made of tungsten-carbide. The special feature of this burner is the provision of an auxiliary air supply, by which a very stable flame is obtained, allowing the liquid pitch to burn at the tip. This ensures satisfactory air mixing and complete combustion and obviates troubles due to sooting and coking at the tip.

In normal times it is possible partially to adjust conditions arising from a slump in the pitch market by increasing sales of road tar. In wartime, when county and municipal authorities are faced with financial problems, there is a tendency for the preservation of existing roads to be neglected. It has been urged that one result of the war should be a keener appreciation by highway authorities of tar for the maintenance and construction of roads, and emphasis has been laid on the need for prudent and well-directed expenditure on highways. The British Road Tar Association has continued its work unabated in applying scientific principles and standardization to road design. A helpful booklet has been issued, entitled " Road Problems in War "—a booklet which is replete with pertinent information. More research work has been undertaken on the desirable properties and on the application technique of road tars. An attempt has been made to correlate tests of tar in the laboratory with its behaviour when applied on the road. Many factors are involved which affect the durability of road tar, such as atmospheric temperature, temperature of the road, humidity, ultra-violet light, type and volume of traffic, and, perhaps most important of all, method of application.

Perfect road binder success is possible only by accurate control during mixing and application. More failures are due to poor technique in using tar than to faulty methods in its preparation. The Report of the Road Research Board, published twelve months ago, is a document calling for study by all interested in road-making technique. An investigation of interest is that relating to the progress of chlorinated rubber tars.

It is interesting to note that in 1939 there were 190,000 miles of highway in this country.

The Paper presented, through The Institution of Gas Engineers to the Public Works, Roads, and Transport Congress, by G. H. Fuidge (South Metropolitan Gas Company), on " Tar Carpets," is one of extraordinary interest.

Liquid products have maintained fairly steady prices. Pure benzole has realized 1s. 10d. per gallon, 95/160 solvent naphtha 2s. per gallon, and the price of pyridine, 90/160, has advanced from 14s. per gallon in January to 17s. 6d. per gallon at the end of the year. Indeed, there are indications that this price may increase still further, as there is a growing demand for pyridine bases in both crude and refined forms. Pure pyridine may be used catalytically in the manufacture of chemo-therapeutics, water-repellent composition for textiles, and general organic syntheses. Moreover, tar distillers have opportunity for development in the use of other products. Little highly-refined anthracene was manufactured at the outbreak of the present war. Anthraquinonoid vat colours are derived by the phthalican-hydride route, but the absence of an anthracene-refining industry connoted a lack of carbazole, the raw material for the valuable colour, Hydron Blue, now in considerable Service demand. It is understood that an enquiry revealed that there was a potential supply of six to seven times the existing one. Quantities of anthracene were being produced, but contained paraffin, which made it unsuitable for use to colour makers. It was soon demonstrated, however, that both carbazole and refined anthracene could be produced capable of meeting the colour makers' requirements. Creosote has commanded a price of 4¾d. to 5d. per gallon during the year.

The Control of Toluene (No. 2) superseded No. 1 Order, made in 1939. The Order covers toluene, toluole, and any material containing more than 2% by volume of toluene. The schedule to the Order fixes the maximum price of nitration toluene, complying with No. VII (1929) specification of the National Benzole Association, as 2s. 5d. per imperial gallon, subject to certain clearly-defined conditions.

Sixties crude carbolic acid increased in price from 3s. at the commencement of the year, to 3s. 9d. per gallon towards the close. The price of naphthalene salts has remained steady, between 75s. and 85s. per ton, whereas refined naphthalene advanced from £16 per ton to £23 per ton in December.

It was impossible to indicate a crude tar price following the collapse of France. Pitch represents 10 to 12 cwt. of a ton of crude tar, and in the absence of an immediate demand for this solid product, it is clear that a price could not be given. Happily where contracts had been arranged upon " JOURNAL " prices, an understanding was reached between buyers and sellers that an interim price should be paid on account, subject to adjustment later, when retrospective prices could be indicated. Increasing quantities of benzole have been produced during the year, and the Advisory Committee of the Mines Department has rendered commendable service in expediting production, and by increasing yields of products obtained by the refining of crude benzole.

During the war of 1914–18, the only process used for the synthetic manufacture of phenol was that based on the fusion of sodium benzene sulphonate with caustic soda. Later an alternative method, founded on the decomposition of chlorobenzene, including the Raschig continuous process, was introduced. A new method now contemplates benzene being dissolved in petrol, and treated with C.O.V. The mixture is heated until all water of reaction has been removed. The reaction mass is then allowed to cool in the still, and a kerosene fraction, boiling between 320° and 360°, is added. After the sulphonic and free sulphuric acids have been neutralized with sodium carbonate, caustic soda in excess is added, and the mass heated until all the water has been removed. The kerosene is eliminated from the reaction mass by filtration, followed by washing with a solvent, and the phenol and sodium sulphite are recovered in the usual manner.

A Controller of Tar Products has recently been appointed, and there is reason to hope that a smoother course may be the lot of those who are responsible for the distillation of tar and the disposal of the resultant products.

Women, the War, and the Industry

So vital is the housewife's part in the war effort, and so linked with the Gas Industry, that we devote a special section of our Review this year to the woman's viewpoint, taking the Women's Gas Council as the focal centre.

The Council had been in existence only three years when, in September, 1938, the Munich Agreement paradoxically made many people realize that war was likely. When it first began the Council's main objects were set forth as : To help to improve home life by the distribution of information on scientific home management ; to provide a means for housewives to study the latest developments on questions such as diet, food values, and hygiene ; to develop a wide understanding of the service of gas, both in the home and in connexion with housing, smoke abatement, child welfare, and the health of the nation ; to bring the housewife into closer touch with the manufacturer and the scientist.

In peace time these aims were developed by educational work, and by active participation in social work, so that it was not difficult to organize the members into units for war work. By the Summer of 1939, 68 classes in First Aid and Home Nursing had been arranged, and training in large-scale catering and cookery given, so that members were able to undertake work in canteens, clubs for service men, and help with midday meals for school children. Much of this work was started in September, 1939, within a few days of the declaration of war, and has continued without a break since.

Most of the branches have formed working and knitting parties, and many thousands of beautifully knitted " comfies " have been sent to " adopted " ships or units in the Army and Air Force.

Publications

News of the work is published in the quarterly magazine of the Women's Gas Council, *Fanfare*, with articles which help the members in their war effort, and on subjects of general interest to women. In the Autumn issue was published the first of a series of articles describing in simple language the working of gas appliances. The series has the general title of " How it Works," and so far the instantaneous hot-water heater and automatic oven control have been described.

In January, 1940, the first of a series of leaflets was published. These appear once a month under the title " I Pass This on to You." Each branch in turn is being asked to contribute a leaflet, written by a member, giving recipes and describing methods used in her national work, either in the home or outside.

These leaflets proved extremely popular and, by special request of the Ministry of Supply, the December leaflet dealt with salvage, and was written by Miss E. Willans, M.B.E. The difficulty has been to keep printing within the limits of a restricted paper supply. Each issue has gone into two editions, and some into four or five. The Women's Gas Council held a small At Home in January to introduce the first leaflets to journalists. Each succeeding leaflet has been well reviewed by the Press.

The Mobile Canteen

Last Winter it was decided that the Women's Gas Council should present a corporate gift to the nation, and that this should be a mobile canteen. An appeal was launched ; Lady Milne-Watson, Vice-President of the Council, and President of the Southend Branch, kindly acted as Honorary Treasurer of the Fund.

The first contribution to arrive was a cheque from Southampton—a branch where meetings had to be suspended at the beginning of the war. Members all over the country responded generously to the appeal, and Lady Milne-Watson presented the canteen to Mr. Austin Pilkington, J.P., Honorary Treasurer of the Young Men's Christian Association, at the Annual General Meeting on St. George's Day, April 23. The canteen has been working in the North of England. Later in the year the Manchester branch visited the canteen. Many parcels of comforts have been sent from Headquarters and branches to be distributed to men using the canteen.

Other Activities

During the year Miss A. M. S. Wilson, B.Sc., has visited branches of the Council and lectured to meetings of allied societies, women's political societies, Townswomen's Guilds, Women's Institutes, Women's Voluntary Services, and similar organizations in London and in different parts of the country. In the late Spring and Summer she spoke at over 60 meetings, usually taking " Food in Wartime " or " Housing " as her subject. Some of these lectures were undertaken at the request of the Ministry of Food and the Ministry of Information.

On May 15 and 16 an Exhibition of Food and Fitness was held at the Royal Institute of Public Health and Hygiene by courtesy of the Council. The Women's Gas Council had a stall of literature at the Exhibition.

On April 13 the Council organized a short Conference in connexion with the Food Education Campaign for Gas Cookery Demonstrators. Miss Willans was in the Chair. In the morning Miss G. S. Summers, H.M.I., Board of Education, spoke on " Food Education in Wartime " and Miss M. P. E. Pearson, Dietitian to the Gas Light and Coke Company, London, on " Food and Fitness in Wartime."

During the year new branches were started at Taunton and Bridgwater. In spite of war conditions the membership of several branches has increased. One branch had a membership of under 400 in Sept., 1939, and by Easter of this year the number had grown to 700. Members who have had to leave a district have often sent their new address to the branch secretary, and a register of these members is being kept at Headquarters and means taken to keep them in touch with the work of the Council, by introducing them to the branch in the new district or by sending them literature.

In all the troubles of war, the Council has proved the value of friendship, and of united effort ; the members are piling up a magnificent record of national service.

Obituary

The passing years bring inevitable changes in the ranks of every profession. If the Gas Industry faces the close of the year no less strong by reason of those well qualified to fill the gaps, it is the poorer, nevertheless, by the loss of several members who have left their marks indelibly stamped upon its history. This annual review gives us the opportunity of remembering and paying tribute to a few of those who have given of their best in the interests of the Industry, to the progress and development of which many others have materially contributed.

The year 1940 was still in its infancy when the Industry lost one of its first and greatest salesmen in the passing of Sir Francis Goodenough, C.B.E., at the age of 67, following a long period of ill-health. He rose by hard work and the strength of his personality from the position of junior clerk with the Gas Light and Coke Company, to a high post in the world's greatest gas company, and to a premier place in the Industry to which he devoted his life's work. He was deeply interested in commercial methods, and the possibility of combining the whole of the Industry was one of his greatest visions. Out of this vision sprang the British Commercial Gas Association—probably the first organization of its kind in any industry. No more fitting monument could be erected to the memory of " F.W.G." than is represented by the B.C.G.A., of whose work he was the inspirer, as Chairman of the Executive Committee for more than a quarter of a century.

Only a week later the Industry mourned the loss of another indefatigable worker in the death of Mr. W. W. Townsend, Managing Director and Engineer of the Colchester Gas Company, at the comparatively early age of 58. It was a tragic coincidence that his death should have so closely followed that of Sir Francis Goodenough, with whom he was elected Joint Hon. Secretary of the National Gas Council only the previous May. By the National Bodies and a number of outside organizations Mr. Townsend has been severely missed, and the Industry in the Eastern Counties in particular has lost a highly valued leader. The Wales and Monmouthshire Association of Gas Engineers and Managers lost their Acting Hon. Secretary in the death of Mr. Wilfrid Jones, who was for many years Commercial Assistant to the Cardiff Gas Light and Coke Company.

January also saw the death " in harness " of the chiefs of three other gas undertakings—Mr. James Cochrane, of Darvel, Mr. J. W. Naismith, of Kilmacolm, and Mr. T. E. Furniss, of Guisborough. Mr. James Hewitt, at the time of his retirement in 1936 Distributing Engineer at Birmingham, and Mr. Charles Chambers, formerly Engineer, Manager, and Secretary of the Harrow and Stanmore Gas Company and subsequently a Director of the Watford and St. Albans Company, also died during this month.

Early in February Clacton lost its Gas Engineer in Mr. Sydney Francis, who was awarded the M.B.E. for his work in organizing the Special Constabulary over a large area of Essex during the last war and the general strike of 1926. For over 20 years General Manager of the Salisbury Gas Company, Mr. N. H. Humphrys passed away at the age of 87. He was twice President of the Southern Association of Gas Engineers and Managers. Also in this month Mr. Robert Poole died at the age of 55. In 1899 Mr. Poole joined the Richmonds Gas Stove Company, Ltd., straight from school. During his forty years of service with them he rose by sheer merit and outstanding ability, to Office Manager and thereafter to Sales Manager, Commercial Manager and Secretary, General Manager and Director, and in June of 1939 he was elected to the position of Chairman and Managing Director of the Company. Mr. W. J. Smith, for many years Engineer and Manager at Bolton, died in March, two years after his retirement. Mr. Smith was a past-President of the Manchester District Association.

The Industry in the Eastern Counties mourned another prominent figure by the death in April of Mr. P. D. Walmsley, for more than 20 years chief executive at Great Yarmouth and Managing Director since 1931. In Mr. Timothy Duxbury the Manchester Association lost another past-President, at the age of 79. A brother of Mr. Thomas Duxbury, of Darwen, he was formerly Engineer at Oldham. With the sudden passing of Mr. E. W. L. Nicol, Engineer and Fuel Expert to the London and Counties Coke Association, the cause of gas coke lost a pioneer and staunch advocate. Mr. Thomas Brown died at the age of 80. Before his retirement five years ago, he was Engineer and Manager of the Matlock and District Gas Company, and one of the founders of the Hathersage Gas Company, of which he was a Director for 34 years and Chairman for twelve.

After 48 years' service with the Aberdeen Gas Department, 38 of which as Engineer and Manager, Mr. Samuel Milne lived to enjoy little more than a year of well-earned retirement. He died in July at the age of 68. A past-President of the North British Association, Mr. Milne also played a prominent part on the Industry's National Organizations, while his qualifications as an engineer were recognized locally by his election for a term to the Presidency of the Aberdeen Mechanical Society and the Aberdeen Association of Civil Engineers.

Early in October the death took place of Mr. Leonard Birchmore, who had served the Louth Gaslight Company as Engineer and Manager for 25 years, having previously held appointments at Ceara (South America), Hertford, Ware, and Leatherhead. Formerly Secretary of the Scarborough Gas Company, Mr. J. W. Nalton passed away later in the month. He had served the Company for 40 years.

In the death last month of Mr. C. Valon Bennett the Industry lost an able administrator and one who had been a tireless worker in its interests. Coming of a " gas " family, Mr. Bennett started his career with the Herne Bay Gas Company, succeeding, in 1910, to the position of Assistant Engineer to the Dartford Gas Company. In 1913 he was appointed Engineer to the Rochester, Chatham, and Gillingham Gas Company, becoming General Manager five years later and shortly afterwards Secretary—occupying the triple post up to the time of his death. Mr. Bennett was President of the Southern Association in 1928, while in 1934–35 he attained the highest honour his colleagues in the Industry could offer him—President of The Institution of Gas Engineers. He was an active member of the Institution Benevolent Fund, and was also a Vice-President of the International Gas Union, having represented Great Britain since 1934 and being Chairman of the Publicity Committee. He gave many valuable years of service to the Committees of the National Bodies, and was indefatigable in his efforts to serve the Industry.

The close of the year has seen the passing of two well-respected members of the Industry north of the Border—father and son within a fortnight of each other. Mr. William Kellock, formerly Gas Manager at Kilsyth, was perhaps less well known than his son, Mr. Archibald Kellock, Engineer and Manager at Airdrie. The latter served for ten years as Secretary of the North British Association, in which capacity his energy and enthusiasm will ever be remembered and appreciated by those with whom he came into contact. Two years ago he resigned the Secretaryship upon his election to the Vice-Presidency, and it was actually during his year as President, to which high office he had not long succeeded, that he died. It was unfortunate that he did not live to enjoy the full year of Presidency—a position well merited by untiring service on behalf of the North British Association.

Stocks and Shares

The uncertainty as to the ultimate trend of European affairs overshadowed in varying degrees practically all business activity in this country for several years prior to the outbreak of hostilities. One result of this was an ever-increasing reaction in the values of securities on the Stock Exchange—a sure barometer of the general outlook. Since the beginning of the war the majority of these values have dropped considerably further, and as many holders have been disinclined to part with their securities at these lower levels except under forced circumstances, and intending buyers consequently unable to obtain their requirements, the volume of business throughout the year has been at a minimum. It is satisfactory to note, however, that British Funds have been an exception to the general rule, for whether the news has been good or bad these have maintained a firm front during the whole of the period under review and now stand considerably higher than a year ago—surely a good augury for the ultimate result of the present struggle. The Miscellaneous Market has occasionally furnished a few bright spots, especially on the good dividend announcements which have appeared from time to time, but these rallies have generally been short-lived and, in the absence of business, quotations as a rule have speedily reverted to their former levels.

ORDINARY STOCKS

	1938. Dec. 30.	1939. Dec. 22.	1940. Dec. 5.
Alliance & Dublin	135	120	117
Associated Gas & Water	18/-	15/6	13/-
Bournemouth 7%	159½	120	105
Brighton 5%	128½	102½	70
British	135½	95	80
Cardiff	120½	100	91½
Commercial	79½	53	39½
Croydon sliding scale	138½	105	85½
Gas Light units	22/9	15/6	14/3
Liverpool	123	100	96
Imperial Continental	113½	70	37½
Portsmouth & Gosport	159½	114½	92½
Sheffield	141	120½	119
South-Eastern Gas Corporation	22/-	16/6	10/-
South Metropolitan	104½	63½	55½
South Suburban	115½	79½	64½
Southampton	107½	80	60½
Tottenham	127½	90	64½
United Kingdom Gas Corporation	18/6	14/6	14/-
Wandsworth	138½	90½	68½
Watford	130½	95	90½

PREFERENCE AND DEBENTURE STOCKS

	1938. Dec. 30.	1939. Dec. 22.	1940. Dec. 5.
Commercial 3% deb.	73½	57½	60½
,, 5% deb.	115½	90	89½
Croydon 5% deb.	114½	95	92½
Gas Light 4% pref.	99½	79½	73½
,, 3% deb.	78½	70½	69½
Mid Southern 4% pref.	97½	75	74½
Severn Valley 4½% cum. pref.	20/6	18/-	16/6
South-Eastern 4½% red. cum. pref.	20/-	18/-	15/-
South Metropolitan 6% pref.	130½	99½	100
,, ,, 4% pref.	97½	75½	71½
,, ,, 3% deb.	76½	65½	62½
South Suburban 5% pref.	110½	92½	87½
,, ,, 4% pref.	97½	77½	62½
,, ,, 5% deb.	115½	95½	94½
Tottenham 4% deb.	97½	80½	79½
United Kingdom 4½% 1st cum. pref.	20/-	15/-	14/6
Wandsworth 4% pref.	97½	75½	62½
,, 5% deb.	115½	95	92½
,, 4% deb.	97½	77½	82½

Gas stocks and shares have been no exception to the general trend, and the volume of business in this market has been at times nearly at a standstill. Values have dropped still further and many are now quoted at the lowest prices ever recorded in their history. In the majority of cases the further depreciations during 1940 have been almost as heavy as those recorded during 1939.

The following table shows the middle market prices of a number of representative ordinary stocks as at the close of 1938 and 1939, and those ruling on Dec. 5 this year. It will be noticed that Gas Light units have stood up to the position well and are only 1s. 3d. lower than a year ago, as compared with a drop of 7s. 3d. in 1939. On the other hand, South-Eastern Gas Corporation £1 shares dropped 5s. 6d. in 1939 and a further 6s. 6d. to 10s. this year.

The position as regards the fixed-interest Stocks is far more satisfactory. It will be seen in the list below that the majority of these now stand only a point or two below the levels of a year ago, while a few have closed even higher.

Doubtless there are holders of gas stocks in some undertakings who are viewing the dividend prospects for the current year with a certain amount of apprehension. Unfortunately it is not possible altogether to allay these fears. It can be said, however, that having regard to its national importance the Gas Industry must inevitably surmount any present difficulties and holders should, if possible retain their securities. While some Companies are having unfortunate experiences there are others, serving reception and industrial areas, who are probably finding it difficult to cope with the increase in business.

CONVERSION OF DIESEL ENGINE PASSENGER VEHICLES TO FUEL OIL AND GAS

By A. F. AMES, *Engineer and Manager, Burnley Gas Department*

IT is realized it is now common practice to adapt petrol engines to run on gas, and much information has been published on the methods adopted, but the conversion of oil engines to gas does not appear to have received the same attention. When experiments were begun by the Burnley Corporation Gas Department and the Burnley, Colne, and Nelson Joint Transport Committee, no data were available. The methods adopted have been so successful ; and the following notes should prove of interest to other gas undertakings and assist in securing a very useful and profitable load.

Before the outbreak of war experiments were made on a double-deck bus driven by a Leyland Titan T.D. 3 six-cylinder diesel oil engine. The compression ratio of the engine was reduced from 16.5 to 1 to 9 to 1 by means of welding up the pot in the crown of the piston and machining its total length to $5\frac{9}{16}$ in., giving a flat crown. The fuel pump was removed from the engine, and a gas mixer designed to fit on the existing air intake. Adapters were made to allow the sparking plugs to be fitted in the atomizer holes, and a distributor drive was arranged from the timing wheel for coil ignition. Gas at 1,800 lb. per sq. in. pressure was supplied from steel cylinders through a pressure-reducing set to the mixer. An air compressor in use at the bus station was used to compress the gas to 1,800 lb. per sq. in.

The engine started up from cold without any difficnlty. The maximum speed of the engine was 1,400 r.p.m., and while the power was quite good in direct drive, the performance on converter drive was not too satisfactory, and this lack of power was a handicap in a hilly district like Burnley. The gas consumption worked out at 50 cu.ft. per mile, which was rather excessive. There is no doubt, however, that further experiments would have enabled greatly improved results to be obtained.

At this juncture consideration of the work and time it would entail to alter a fleet of diesel engine buses in an emergency—that is, the fitting of new pistons, modifying the timing gear and electrical equipment, and also the probability that there would still be available a percentage of the normal fuel supply—prompted the Manager of the Joint Committee to carry out further tests on a standard engine using fuel oil for ignition purposes, and to combine the use of fuel oil and gas. A new type gas mixer designed by the Joint Committee was fitted to the standard six-cylinder oil engine, using the compression ratio 16.5 to 1. The fuel pump delivery was cut down to 20 c.c. per 1,000 strokes, and the gas valve was interconnected with the fuel pump control.

The gas supply was governed by a Hessenwerk reducing valve, and on starting up the maximum engine speed was easily attained. On a road test the power was quite good, and the gas consumption was approximately 22 cu.ft. per mile with a fuel oil consumption of 25 m.p.g. These tests proved very satisfactory, but by the time they were completed war had been declared, and it was found impossible to obtain a suitable compressor and storage cylinders, so that the use of gas stored under pressure had to be abandoned, but the information obtained had been very useful and may be put to practical use in the future.

The next step was to consider operating single-deck buses with gas stored in the usual type of canvas container. The bus was a Leyland four-cylinder diesel engined single-deck 38-seater bus, with a gasbag mounted on the roof of a capacity of 650 cu.ft.

The engine has $4\frac{1}{2}$ in. bore, $5\frac{1}{2}$ in. stroke, and the compression ratio is 15.5 to 1. No alterations were made to the engine other than to the controls, and following upon the successful experiments already made of a combination of gas and fuel oil, the following method was decided upon.

The engine is started on fuel oil, full delivery being obtained by operating a lever mounted on the fuel pump control quadrant against a retractable spring-loaded maximum delivery stop.

After starting the fuel pump delivery is restricted to approximately one-third of the normal amount. The gas supply to the air-gas mixing valve is controlled by means of a butterfly throttle operated by the accelerator pedal. The control is so arranged that the initial movement on the pedal opens up the fuel pump to the limits allowed, and as this control is operated by means of a rod with a compression spring in circuit, further movement of the pedal opens the gas throttle. The engine idles on fuel oil alone, and the air supply to the engine is at all times unrestricted. Thus it is a comparatively simple matter to change over to diesel fuel operation in an emergency.

This bus is operating on a hilly route and a frequent stop-start service. The gas consumption is approximately 300 cu.ft. per round trip of 13 miles, and the fuel oil consumption is approximately 26 miles per gallon. The power results are equal to those when running on diesel fuel only.

Previous to the use of gas, the fuel oil consumption on this bus was 100 gallons per week, whereas after the introduction of gas the consumption per week was 36 gallons of fuel oil and 21,300 cu.ft. of gas. This not only is a big saving in fuel oil, but also results in much cheaper running of the bus, there being a saving of approximately one-third of the fuel costs.

It was found necessary to provide a cover for the gasbag, to prevent the upsetting of the mixture through fluctuations or surging in the gas feed caused by varying wind pressure, and at the same time to protect the bag from the effects of the weather.

In order to cut down the length of time taken to fill the gasbag at the terminus, it is " topped-up " after each trip. A gas-filling point has been installed at the terminus by the Gas Department, the supply being from a 6-in. main, and the necessary quantity of gas (300 cu.ft.) is supplied in about three minutes. A flexible hose from the filling point connects to a standard non-return valve filler fitted alongside the engine bonnet.

In view of the success attained with the one bus, the Joint Committee have sanctioned the conversion of a further seven buses of similar type to complete the number of vehicles required for the service on one particular route.

The conversion of the whole of the buses is not quite complete, but when the eight buses are running this will mean a gas consumption of approximately 8 million cu.ft. per annum.

The conversion of the buses will also materially assist in conserving fuel oil, which has to be imported into this country, as there will be a reduction of over 26,000 gallons in the quantity of oil used by the Joint Committee per annum.

Personal

T. P. Ridley

At a recent meeting, the Directors of the Newcastle-upon-Tyne and Gateshead Gas Company received and accepted the resignation of Mr. T. P. RIDLEY, F.C.I.S., General Manager and Secretary, who is retiring after 51 years' service with the Company. Mr. Ridley was appointed to a seat on the Board.

Entering the Gas Industry as a Junior Clerk with the Newcastle Gas Company in 1889, Mr. Ridley eventually became Secretary in 1918, and finally rose to his present position of General Manager and Secretary in 1938. On the occasion of that appointment the late John E. Cowen, then Chairman of the Company, paid high tribute to Mr. Ridley when he said that he was " regarded as one of the ablest and most go-ahead administrators in the Gas Industry. . . . It is no exaggeration to say that had Mr. Ridley desired he could in all probability have had a more lucrative and perhaps more spectacular position elsewhere, but his loyalty to the Company he joined as a boy kept him in Newcastle, to the great advantage of the Company."

In this respect it may be noted that more than 200,000 consumers have been added to the Company since Mr. Ridley joined it in 1889, while the figures for sale of gas also bear striking testimony to the progress of the Company since that date. On the completion of 50 years' service with the Company a presentation was made to Mr. Ridley by the Directors, and on that occasion particular reference was made to his active share in the introduction of various schemes for the benefit of the Company's servants.

Outside the Newcastle Company, Mr. Ridley has rendered outstanding service to the Industry as a member of the Executive Committees of the National Gas Council, British Commercial Gas Association, Sulphate of Ammonia Federation, British Pitch Association, and British Road Tar Association, and as a member of the Durham District Committee of Investigation under the Coal Mines Act, 1930. He was a member of the National Gas Council Committee on Gas Charges whose report was issued in 1928, and a Member of the Board of Trade Committee on Gas Legislation upon whose recommendations the provisions of the Gas Undertakings Act, 1934, giving the Industry liberty to introduce Multi-Part Tariffs, were based. He submitted Papers on behalf of the Gas Industry to the World Power Conference in London, 1928, and Berlin, 1930, and also to the American Gas Association on the occasion of the visit to America of the delegation from The Institution of Gas Engineers in 1933. He was President of the North of England Gas Managers' Association in 1937, and was awarded the Institution Silver Medal for a Paper on Gas Tariffs which was read before the Association. Mr. Ridley has also given evidence before Select Committees of Parliament on various gas questions.

Besides his appointment to the Newcastle Board, Mr. Ridley is a Director of the Shotley Bridge and Consett District Gas Company, Newbiggin-by-the-Sea Gas Company, Ltd., Amble and Warkworth Gas Company, and the National Benzole Co., Ltd.

Few men have won for themselves greater respect—and more friends—in the Gas Industry. They will unite with us in wishing him many years of happiness in retirement.

* * *

Mr. E. CROWTHER, M.Eng., who is at present Chief Engineer and Assistant General Manager at Newcastle, has been appointed to succeed Mr. T. P. Ridley as General Manager.

* * *

An interesting ceremony took place in the North British Station Hotel, Edinburgh, on Dec. 11, when Mr. JAMES JAMIESON, Chairman of the Scottish Management Committee of the National Gas Council, was presented by his colleagues on the various Management Committees of the National Bodies in Scotland with a gift to mark the occasion of his recent marriage. The gift took the form of a silver condiment set suitably inscribed, and the presentation ceremony was presided over by Mr. James Campbell, Vice-Chairman of the Scottish Management Committee of the National Gas Council. Mr. David Fulton in making the presentation to Mr. Jamieson expressed on behalf of members their appreciation of his good work and capabilities, and said they were desirous of marking the occasion of his marriage by conveying their goodwill towards him in a tangible form. He (Mr. Fulton) and his colleagues wished Mr. and Mrs. Jamieson all health and happiness and prosperity in the future. Mr. Jamieson suitably replied.

* * *

The marriage has taken place at Llanfachraeth of Mr. A. IFAN JONES (Managing Director of the Holyhead and North Wales Gas and Water Corporation, Ltd.) and Miss Jane M. Rowlands.

* * *

Mr. GEORGE MARTIN, A.C.I.S., A.C.W.A., has been appointed General Manager of the Davis Gas Stove Company, Ltd. (Radiation Ltd.). Mr. Martin joined the Company as Secretary on the retirement of Mr. Seaton Wood.

* * *

The Stirling Gaslight Company have appointed Mr. OSWALD T. LONGDEN, Assistant Manager of the Musselburgh Gas Company, to succeed Mr. C. B. S. Mitchell, who was recently appointed Assistant Engineer and Manager at Dunfermline.

Notwithstanding War Damage, Messrs. William Sugg & Co., Ltd., advise us that they are able to execute orders for gas appliances without undue delay.

At a Meeting of the Hamilton Town Council it was reported that the number of gas lamps with emergency fittings was now 293. It was agreed that 150 additional fittings be installed at a cost of £275 for the lighting of the junctions of all roads.

James Stott & Co. (Engineers), Ltd., announce that they have temporarily removed their London Office from 145, Queen Victoria Street, to 25, Hill View Road, Hatch End, Middlesex, for sales ; and 65*a*, Upton Road, Bexley Heath, Kent, for maintenance and service.

Extensions of the Scheme of modified lighting in Manchester will cover (*a*) roads used by public service vehicles, and (*b*) important connecting roads, shopping streets, and roads likely to be used by the various A.R.P. services.

In Connexion with Cambridge War Weapons Week, the Cambridge University and Town Gas Light Company have invested £1,000 in 3% Defence Bonds, and £4,000 in 2½% National War Bonds. Cambridge set out to obtain £500,000 and the final figure has been returned at £908,269.

Copies of the Following Recently Published British Standard Specification (A.R.P. Series) may be obtained on application to the Secretary, The Institution of Gas Engineers, 1, Grosvenor Place, London, S.W. 1 : BS/ARP 52. "A Simple Portable Standard of Brightness," price 8d.

The Transport Committee of South Shields Town Council reports that gas-operated buses in the borough have proved successful. The Committee has decided to accept an offer by the Newcastle-upon-Tyne and Gateshead Gas Company to supply gas for a year for experimental traction purposes at 4d. a therm instead of 7.6d. a therm as at present. To facilitate the filling of gasbags the Committee is to provide a gas tap and meter at the Market Place.

British Gas Federation

The Joint Secretaries of the British Gas Federation announce that the Council of the Federation has decided that in view of the present exceptional circumstances the Sixth Annual General Meeting shall be deferred until such time as it is possible for the Federation to resume its normal functions.

Forthcoming Engagements

Jan.
14.—I.G.E.—Council Meeting.
14.—N.G.C.—Central Executive Board, 12.30 p.m.
14.—National Joint Industrial Council for the Gas Industry.—Meeting at Gas Industry House, 2.15 p.m.

"Gas Journal" Directory

In order that readers may be able to keep the particulars contained in the " JOURNAL " Directory up to date, we summarize changes of which we have been advised during the past month :

Page 50. NEWCASTLE-UPON-TYNE. E. Crowther appointed G.M., *vice* T. P. Ridley, retired.
,, 64. SOUTH SUBURBAN. D. L. Horlock appointed S. & V.W. Stanton, Com.M.
,, 72. UCKFIELD. W. H. Swallow, E. & M., retired.
,, 80. AIRDRIE. A. Kellock, E. & M., deceased.

Mechanical World Year Book, 1941*

As with the last edition, the selection of matter for this year's edition of the *Mechanical World Year Book* has been guided largely by wartime needs. The tabular matter (a separate index to which has been given) continues to offer a wealth of information, while the text generally has received numerous detail revisions to keep it up-to-date. Completely new sets of tables for all the more familiar ball and roller bearings appear in the new edition. New and novel formulae permit of the quick ascertainment of the bearing required for definite service conditions and for any speed instead of the restricted number of speeds given in the usual load tables. This feature not only makes the data compact and therefore easy of access, but also greatly aids calculation. New matter is included on the various case-hardening processes. This is a subject which, like ball and roller bearings, is intimately connected with the high-duty machinery now of such paramount importance.

* Emmott & Co. Ltd., 28, Bedford Street, Strand, W.C. 2. Price 2s.

Calendars, Diaries, &c., Received

Seasonable gifts in the form of Calendars, Diaries, &c., have been received from the undermentioned friends, whose good wishes are cordially reciprocated :

John G. Stein & Co., Ltd., Bonnybridge, Scotland.
Gas Meter Co., Ltd., 238, Kingsland Road, London, E. 2.
Oxley Engineering Co., Ltd., Leeds.

Steady Water Temperatures

The Leonard Mixing Valve

Constant hot and cold water is a necessity to modern civilization, but the most perfect system yet devised is not complete without some reliable means of keeping the temperatures steady at such vital outlets as the sickroom wash basin, the A.R.P. cleansing centre, or the domestic shower bath. Everybody has had the experience of standing under a shower and finding it first hot, then cold, then hot again, and so on. That is a defect of the ordinary method of mixing hot and cold water to make a stream of warm water, a defect probably due not to any fault in the system, but to the human element in calling for fluctuating supplies along the pipes. With the Leonard Thermostatic water-mixing valve, about which Walker, Crosweller & Co., Ltd., Whaddon Works, Cheltenham, have sent us a budget of extremely interesting literature, that cannot happen. The Leonard valve keeps the temperature steady, whatever happens. The most common occurrence in any water supply system is a sudden drop in the pressure. Taps are turned on or valves opened in other parts of the building, and down goes the pressure of hot or cold water like a stone. In the Leonard valve the thermostat moves to compensate for such fluctuations. If too much cold comes down the pipe, the thermostat closes the port that admits it ; if too much hot, it closes the port that admits the hot. If the hot begins to lose heat the thermostat gradually closes off the cold and lets in more hot to make up for it. Whatever happens in the supply, the Leonard valve delivers warm water in a steady stream at the temperature for which it has been set. The enormous waste of water through mixing hot and cold and gauging the right temperature by trial and error is obviated, the risk of serious accident from scalding or sudden chilling is averted, and the human element is eliminated from a process that can much better be operated by thermostatic control. Such valves are used in hospitals all over the world and have lately found a big field in militia camps and in civil defence organizations.

The same principle is applied in the Leonard thermostatic steam and water mixer by means of which steady hot water is produced by the direct mixing of steam and cold water without risk and without noise. The arrangement by which the temperature of the hot water can be adjusted at will, and the device locked at a given point, renders the valve particularly suitable for industrial purposes, such as laundries, breweries, hotels and restaurants, tanneries and dairies. The steam pressure determines the volume of blended water obtainable at any required temperature.

Koppers Coke Oven Company Taken Over

The goodwill, patents, Trade Mark " Koppers " and other similar assets of the Koppers Coke Oven Company, Ltd., of Sheffield, have been taken over from the Receiver of that Company by the Woodall-Duckham Vertical Retort & Oven Construction Company (1920), Ltd., who are now in a position to deal with enquiries for various types of plant and apparatus formerly supplied in this country by the Koppers Coke Oven Company.

The Institute of Fuel

Awards of Melchett Medal and Students' Prizes

A meeting of the Institute of Fuel was held at the Connaught Rooms on Thursday, Dec. 12, at which the President (Lieut.-Colonel J. H. M. Greenly, C.B.E.) announced the award of the Melchett Medal and the Students' Medal and Prizes for 1940. Preceding the meeting there was an informal luncheon, at which Mr. W. M. Selvey (who has been acting as President during Colonel Greenly's absence abroad) presided.

The President announced that the Melchett Medal for 1940 had been awarded to Professor Etienne Audibert (of France) ; and he added that a strong Committee in France, under the Presidency of Mons. Dautrey (who was the French Minister of Armaments), had recommended Professor Audibert as being the outstanding recipient Unfortunately, however, since the disastrous happenings of last summer the Institute had not been able to get into touch with any of its French friends, and in particular with Professor Audibert. Therefore, all that could be done was to announce the award, and to keep the Medal in safe custody until it could be presented.

(The Institute's Annual Dinner and Dance, at which the Melchett Medal and Students' Medal are usually presented, was not held this year.)

The Students' Medal, for the best Students' Paper for 1940, was presented to Mr. L. H. F. Nichols (of the Research Staff of the British Coal Utilization Research Association). His Paper was entitled ' Gas Sampling and Temperature Measurement in the Fuel Bed." The Medal was accompanied by a prize of books.

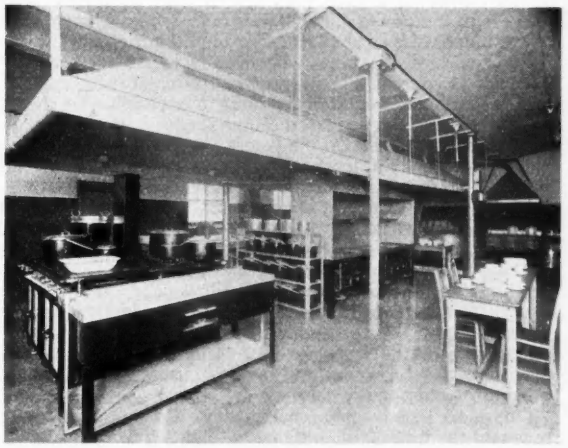
A special prize, consisting of books, was presented to Mr. H. Buckley (a member of the staff of the Paterson Engineering Company), for a Paper which the adjudicators had considered to be very well worthy of a second award.

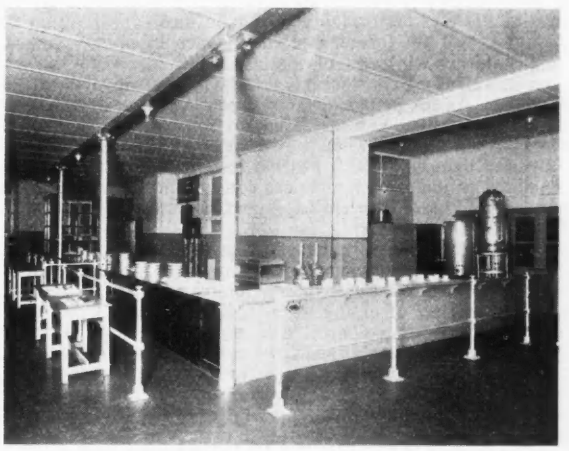
A Further Rawlplug Improvement

More Useful to the Gasfitter

Since its introduction some months ago the Rawlplug electric hammer has been rendered even more useful to the gasfitter by the addition of special tools, and by its application as a riveting machine. The special tools include a raking chisel for raking out cement and plaster between bricks, chasing tools for chasing slots to take conduit and piping, chisels for cutting slots or chipping away superfluous material, and a comb and holder attachment for use on brickwork to provide a keying for concrete. These tools make the hammer much more universal, particularly on brick. It has, as its price suggests, a limited capacity, and for this reason the makers do not recommend the use of tools on cement work unless it is reasonably soft. The tools can be sharpened in the usual way. The electric hammer can be used as a riveting machine because of its succession of rapid blows. The relatively small percussive power of the hammer does not permit its use for continuous riveting, but on occasional work it is quite satisfactory. Riveting dolleys can easily be fitted to the hammer and are available in a standard range of sizes from one-sixteenth to quarter inch.

Modern Gas Equipment in New Works Canteen





This canteen was designed by Messrs. James Stott & Co. (Engineers), Ltd., in conjunction with Mr. Hill, of Messrs. Howard & Bullough, of Accrington, for installation at the works of the latter firm. The equipment includes central type cooking range, fish-fryers, bain maries, potato-peelers, dish-washing machines, preparation sinks, boiling pans, service hotclosets and carving tables, tea-making urns, roasting ovens, steamers, &c. The whole of this comprehensive installation is fully in keeping with up-to-date catering practice, all the cooking being carried out in one kitchen, with service lifts to two floors. The installation represents a considerable load for gas.

LIGHTING OF FACTORIES

[Specially Contributed]

EVERY artificial lighting installation, if it is to be satisfactory both to the factory owner from a cost point of view, and to the management and the workpeople from the angle of effectiveness, must comply with certain fundamental principles—*i. e.*, adequate illumination for the particular work to be done, absence of glare, uniformity of illumination of the working area, and absence of dark patches and shadows. These standards can be attained only by the use of good quality, well-designed lighting units and regular maintenance. Unfortunately lack of appreciation of the importance of this latter point, and, in many cases, absolute indifference on the part of users and executives in the Gas Industry, have given rise to an idea that gas lighting is out of date.

Although the running cost of the lighting system is not, in the average factory, a serious item compared with labour and other operational charges, and in most cases is applicable only to about four months in the year, any saving in this respect is worth consideration provided the degree of illumination is not sacrificed. A really good gas lighting installation usually costs less per unit of light than any other method, even when electric current is generated on the premises. Since the period when artificial lighting is required coincides with the colder months of the year, most factory and workshop employees welcome the additional warmth derived from gas lighting.

It is now generally agreed by factory owners that good work can be turned out only by first-class machinery in the hands of skilled operatives, yet facilities for ensuring greater output through adequate illumination do not always receive consideration.

The fourth and fifth reports of the Departmental Committee on Lighting in Factories, and the appendices thereto, are useful only in so far that they indicate what should—and should not—be done. The solving of the problem to the satisfaction of the factory owner is left to the knowledge of the lighting engineer. Research on the effectiveness of gas burners and different types of shades has placed artificial lighting on a scientific basis, and evolved formulae which, used in conjunction with the recommendations prescribed for any particular operation, will ensure a system of lighting adequate for any industrial operation.

In planning any lighting system one must visualize the eventual effect of the scheme, based on a knowledge of the process to be carried out, and on whether local or uniform illumination is to be provided. In general it will be found that where an illumination of 10 ft.-candles or more is provided at the actual working plane, a maximum reduction of 2 ft.-candles to 3 ft.-candles in other parts of the working area is not discernible by the workers. With an illumination of 6 ft.-candles or less, reductions in adjacent areas are quickly noticed.

That good quality burners and equipment are essential cannot be over-emphasized, and this is equally important whether low-pressure or some method of pressure lighting is to be used. The difference in cost between high class and inferior quality burners may appear considerable at first glance, but when the relative life and performance are taken into consideration the advantages of the former become at once apparent. A good quality burner will probably outlast half-a-dozen of the cheap type, as well as use considerably less gas for an equivalent output of light. As an instance, recent tests on two similar three-mantle burners gave an increased gas consumption of 39% for the cheaper pattern when both were adjusted to the same measured light emission. Further tests of these burners when regulated to the same hourly gas consumption gave an advantage of 46% more light emission over a given area in favour of the good quality burner.

Uniformity of pressure must be assured if really good lighting is to be achieved, and some form of pressure governing should be incorporated in the system. In a large scheme, with, maybe, hundreds of feet of piping, some loss of pressure from piping and fittings is unavoidable, and uniformity throughout the system cannot be established from one governor. Under such conditions it is preferable to sectionalize the system and fit separate governors for each group of lights. This question of pressure is intimately bound up with that of gas consumption and performance efficiency. It also raises the issue of burners with fixed nipples *versus* burners with regulators, and much can be said in favour of both types. Undoubtedly, where governors can be installed to maintain a constant pressure throughout the system, a burner with correctly-sized fixed nipple will not only reduce capital cost of the installation, but will minimize complaints of variation in illumination caused by interference by workpeople, and will also reduce maintenance costs.

Most factories suffer to a greater or lesser degree from dust or similar foreign matter in the atmosphere which clogs the injector nipple and the air ports unless some form of filter is fitted around the air ports. Most manufacturers are prepared to supply a form of filter, many of which are effective against the finest dust or the most heavily contaminated atmosphere, but very few filters have a sufficient surface to ensure their satisfactory performance throughout a whole lighting season. If the system is to be entirely trouble-free, dust traps should be fitted on every drop pipe and every pendant fitting, and these can be conveniently made up in any workshop from standard fittings.

The gas regulator, if fitted, should be of the central needle type, substantially constructed, with the needle perfectly centred to the orifice, but not actually coming in contact with the sides, even when regulated to the minimum consumption. The open end nozzle with perforated disc is preferable to the nozzle with perforated end, and is certainly helpful to the filter when regulating the size of flame. On all but the smallest size of burner a superheater is absolutely essential, the metal type being superior both in performance and length of life to those of clay and similar materials.

Insufficient attention has been paid in many burner designs to the dispersal of the products of combustion. In some instances the openings are scarcely large enough to allow the products to pass rapidly from the neighbourhood of the mantles, while in other cases the shields are not large enough to divert the products away from the air ports, with the result that a mixture of waste gases and air, instead of air only, is entrained by the injector.

The correct spacing of the lighting units is governed by the work to be carried out, the position occupied by the workers, and the height—if above floor level—at which the work will be done. Most bench and machine operations are carried out at a height of 28 in. to 34 in., which therefore gives a convenient mounting height of 7 ft. 6 in. to 8 ft. 6 in. above floor level. If the illumination is to be uniform throughout the working plane the lighting units must be spaced at distances between one-and-a-half and twice the mounting height. With units so spaced there should not be any appreciable difference of illumination of the working surface midway between the units. Spacing at wider intervals will reduce the illumination between units to a degree which may adversely affect production and will certainly cause shadows in both horizontal and vertical planes.

The new lighting regulations make provision for the prevention of glare both from the light source itself and from reflected glare from machinery and other surfaces on which the light may fall. This means, of course, that correctly designed reflectors must be employed, which, while fulfilling the primary object of increasing the illumination and directing it to the working surface, must also be of such a form as to cut off direct vision of the light source at a prescribed distance from the unit. Many of the older types of shallow reflectors do not comply with the new regulations. In cases where the factory owner cannot be persuaded to purchase new reflectors, a circular metal extension, with a turned-over edge slightly less in circumference than the existing shades, can be placed on the shades. The depth of the extension will depend on the height at which the burners are mounted; usually a depth of 2 in. to 3 in. will be sufficient to ensure the screening of the light at the prescribed angle of 20°.

The type and depth of shades must be kept in mind when working out the spacing of the lights, otherwise, if deep shades are used the angle of cut-off will be too acute, light will be concentrated in the proximity of the units and the general effect will be patchy. The shape of the shade will depend on whether the illumination is to be spread over a fairly wide area such as a bench or table, or directionally concentrated at a particular point, such as the faceplate of a lathe or similar machining operation. Deep shades and parabolic ones also afford additional protection to the mantles.

One of the disadvantages held against gas lighting in the past has been the trouble of bringing the lights into operation. In a large factory this may be a considerable inconvenience if one person has to visit each lamp. The trouble can be minimized to some extent by the provision of by-passes on each lamp, but this is not commendable since it usually leads to frequent mantle breakage through interference by operatives. This is particu-

larly the case in weaving mills, clothing factories, and similar establishments where hundreds of lights may be fixed on one floor. If the building is both long and wide with a roof supported on pillars or stanchions, the fixing of independent switches to each light becomes difficult and the cost prohibitive. Where large units are in use, spaced at fairly wide intervals, as in warehouses, foundries, erecting shops, and the like, the lighting can be divided into groups and operated by means of distance control devices, of which quite a number of reliable ones are on the market.

Recommended Illumination for Factories and Workshops.

	Ft.-candles.
Foundries and Machine Shops:	
Rough Moulding	8
Fine Moulding and Core Making	10
Bench Work and Grinding	12
Fine Bench Work	20
Polishing	12
Inspecting	10–35
Assembly (ord.)	12
,, (fine)	40

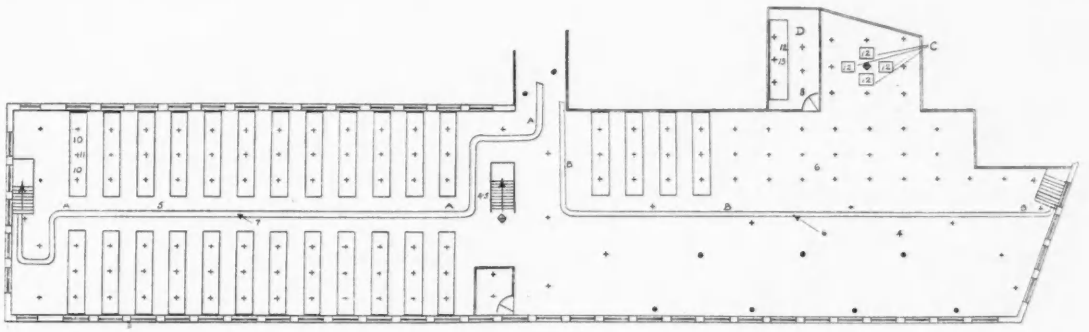


FIG. 1.—A *and* B, *Conveyers.* C, *Printing machines.* D, *Designing room. Figures denote measured illumination at points shown.* + 300 *c.p. lamps with* 14 *in. shades.* ● 120 *c.p. lamps with* 14 *in. shades.* ⊠ 450 *c.p. lamps with* 14 *in. shades. Scale* 16 *ft.* = 1 *in.*

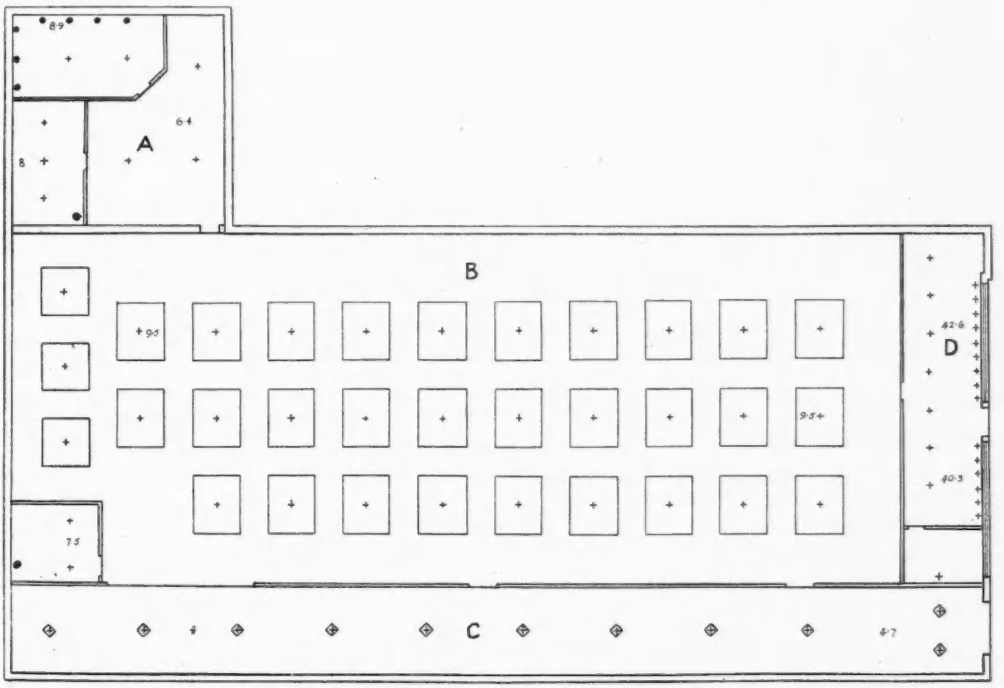


FIG. 2.—A, *Offices.* B, *Assembly shop.* C, *Stores and loading-bay.* D, *Showrooms. Figures denote measured illumination at points shown.* + 300 *c.p. lamps.* ● 120 *c.p. lamps.* ⊠ 450 *c.p. lamps. Scale*16 *ft.* = 1 *in.*

The cost of independent switches to each lighting point adds so much to the cost of an installation that only where the owner is either a large consumer, or is persuaded to take a long view of the question and consider the eventual savings in running costs over a period, can one expect to receive an order for a large installation complete with switches. As the cost of switches alone is often higher than that for switches, wiring, and lampholders for electric lighting, the complete charge for burners, pendants, piping, &c., certainly does appear excessive.

Of the various types, the battery-operated one with self-igniter is most suited to factory conditions and cuts out any trouble which might arise from by-pass failure. Batteries, in normal times, will easily last through a whole lighting season; igniters may be expected to have a life of at least three seasons if correctly positioned and not mishandled, and the fact that lighting and extinguishing is automatic makes mantle breakage negligible.

Pottery and Clay Works :	
Making and Pressing Shops	8
Dipping and Glazing	10
Printing Presses	12
Sheet Metal Working :	
Bench Work and Machines	12
Printing Works :	
Casting Shop	12
Type Setting	25
Litho. Work	15–25
Confectionery and Food Products :	
Mixing Rooms	10
Making Shops and Presses	12
Weaving Mills :	
Looms	12
Cloth Inspection	20

Fig. 1 shows a typical low-pressure gas-lighting installation in a factory where uniform illumination on benches and freedom from reflected glare and shadows is essential. A minimum of 10 ft.-candles on benches and 6 ft.-candles on conveyers was specified. The complete installation comprises 9 120 c.p. lamps, 139 300 c.p. lamps, and 2 450 c.p. lamps, all fitted with separate switches except the two end lights on each bench, which are controlled by the same switch.

Cost of Installation (Pre-War).

Burners	£23	19	11
Mantles	5	2	3
Switches	77	1	8
Cable for Switches	12	8	7
Shades and Reflectors	39	18	0
Piping and Materials	62	17	4
Labour	35	14	6
	£257	2	3

With profit added the cost of the installation was considerably higher than for an equivalent electrical scheme, but the running costs—which have not been exceeded—were approximately 40% of the guarantee quoted by competitors.

Fig. 2 shows one floor of a gas-lighted factory, A being office block, B assembly shop, C stores and loading-bay, and D showroom. The office is lighted by 120 c.p. burners with deep shades on wall brackets immediately above the desks, and by pendant lights with 300 c.p. burners and open-bottom heat-resisting bowls, each light being separately switch controlled. In the assembly shop each bench is fitted with 300 c.p. pendant light with 14 in. enamelled steel reflector mounted 4 ft. 10 in. above the centre of the bench, two similar lights and one 120 c.p. light being fixed in the supervisor's office. The latter are switch-controlled, and each alternate light on the side benches of the shop is likewise fitted with a switch.

The stores and loading-bay are lighted by 450 c.p. burners with enamelled steel reflectors centred at intervals of 20 ft. grouped in two sets of four lights and one set of three lights, each set being complete with distance control. The showroom is fitted with seven 300 c.p. pendant bowl lights and 15 300 c.p. window lights with stainless steel parabolic reflectors. 11 switches, each controlling two lights, have been fitted. A 300 c.p. pendant light is also fixed in the small office at the end of the showroom.

Cost of Installation (Pre-War).

Burners	£14	6	0
Pendants and Brackets	16	19	0
Mantles	2	16	3
Switches and Controls	30	19	0
Cable for Switches	4	1	0
Bowls and Reflectors	28	16	6
Piping and Materials	41	16	0
Labour	28	7	0
	£168	0	9

Regular maintenance is as important from the point of prestige as from that of satisfaction to the consumer. Lighting fittings, unlike many appliances, are not subject to heavy wear and tear, and, therefore, provided good quality burners are installed in the first place, no replacements other than mantles should be needed for a considerable time. It will usually be found that most lighting complaints arise from maladjustment of the burners—a point in favour of fixed nipples—or from partial blockage of nipple or air ports by foreign matter. Where gas regulators are fitted employees often interfere with these at the first sign of diminution in light emission, although the fault can usually be remedied by blowing gently at the air ports. If an installation is thoroughly overhauled prior to the commencement of the lighting season, attention being paid to clearing dust-traps as well as burners and gas cocks, it should not be necessary to make any other visits except for inspection and replacement of damaged mantles throughout the whole season. Where visits are made for the latter purpose maintenance men should be instructed to clean and re-regulate each burner attended, and not simply replace mantles without making certain that everything else is functioning correctly.

SCOTTISH JUNIOR GAS ASSOCIATION
(EASTERN DISTRICT)

Presidential Address

of

COLIN D. BLACKHALL (Edinburgh)

[Abstract]

I PROPOSE to deal in my Presidential Address with the aspect of the issuing, repairing, and reconditioning of gas appliances in general, and general routine in workshops. Perhaps our methods may help in a small way to solve some problems that may arise in other undertakings.

In Edinburgh the Workshops are situated in a quiet side street near the centre of the City, and are so placed that contact can be quickly made with any district. The selection of this site was a very wise one, and it is interesting to note that it occupies the old gas-works site prior to its removal to Granton. The entrance to the Workshops allows two motor vans to stand in a loading bay, and these motors can stand there garaged all night or day. The level of the Workshops is similar to the levels of the floors of the motors and a loading board is kept for large motors coming in.

The plant in the Workshops consists of two brassfinisher lathes, a screwing machine able to take from ½ in. to 3 in. pipes, a mechanical saw, a vertical drilling machine, an air compressor able to work at 45 lb. to sq. in., a sand blast machine of the latest type capable of dealing with the largest of cooking appliances, an emery stone, a polishing buff, and finally an 8 h.p. gas engine to supply the power. In addition to this there is a pipe-bending machine. All the plant is carefully guarded according to Home Office regulations.

The attendants on the plant have certificates authorizing them to have charge of the care and upkeep of plant. No oiling of plant is permitted except when the machines and shafting are stationary. Accidents are the bugbear of managements, and every endeavour is made to avoid these. For operators there is set aside adjacent to the emery stone a set of goggles, so that foreign bodies are kept from the eyes. The floor of the Workshops is marked off with white lines, and gangways are kept clear of appliances, pipes, &c. The lines are marked once a week, and it is quite easy to find one's way through the Workshops even in darkness, as these lines definitely give an excellent guide. Each section is also carefully marked off and the different sections are made responsible for the tidiness and cleanliness of their portion.

The lighting in new Workshops is by gas, 5-lt. Littleton lamps being used overhead and a few wall brackets being judiciously placed for bench work. The tinsmiths and brassfinishers have gas bolt heaters on their benches and a 4 ft. guillotine helps the tinsmiths with their work, and also in this section there are the usual tinsmiths' tools and various sizes of rollers, anvils, cutters, &c.

The heating of workshops is a difficult proposition, as the large doors are open for a considerable time at various hours during the day, due to transports coming and going, bringing and despatching goods.

It was found after various experiments that localized coke fires were the most suitable for heating this type of workshop and accordingly a few were fitted, and have given satisfaction.

Wash-hand basins are fitted for the use of the men and a large "Ascot" heater is used for hot water. Individual towels are supplied to each man in the Workshops and these are renewed once a week by a towel service firm.

When cookers, hotplates, grillers, and oven burners are brought into workshops, they are taken up to the large gas oven for "burning off." These appliances are stripped of all brass work—*e.g.*, cock rails are taken off cookers and hotplates. The cornices and bridges are also taken off the cookers. This allows more head room in the oven and hotplates. Burners, &c., are placed on top of the cookers and thus floor space is saved in the oven. About 20 cookers can be stacked into the oven, and when fully charged the oven is left on for about 5–6 hours. The fittings of the black cookers are placed inside the ovens of the cookers on the top of the spar shelves and are burnt off with these appliances.

The oven has six atmospheric burners and the consumption

Gas Products Prices

The London Market

Dec. 23.

Prices of Tar Products in the London Market remain to-day unaltered. Present values are as follows: Pitch is nominal; creosote is about 4⅜d. to 5d. per gallon; refined tar 3⅜d. to 4d.; the price of pure toluene under the Ministry of Supply Toluene No. 2 Order is 2s. 5d. per gallon; pure benzole is 1s. 10d.; 95/160 solvent naphtha is 1s. 11d. to 2s.; 90/160 pyridine about 15s.; all per gallon naked; refined naphthalene crystals £23 per ton in bags; all *ex* Makers' Works.

The Provinces

Dec. 23.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 1s. 10d. (controlled by the Control of Toluene No. 2 Order, July 5, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North 9½d. to 10d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha, North, 1s. 5d. to 1s. 6d. Creosote, *ex* works, in bulk, North liquid and salty, 4¼d. to 4⅜d.; Scotland, 4¼d. to 4⅜d.; low gravity, 4¼d. to 4⅜d. Fuel Grade 4d. to 4¼d. Carbolic acid, 60's, 3s. 9d. to 3s. 10½d. Naphthalene, £15 to £20. Salts, 75s. to 85s., bags included. Anthracene, "A" quality, 4½d. to 4⅝d. per minimum 40% purely nominal. Heavy oil: Unfiltered anthracene oil (min. gr. 1,080), 5¼d. to 5½d.; filtered heavy oil (min. gr. 1,080), 5⅜d. to 6d.; heavy anthracene oil gr. less than 1,080, 6d. to 6¼d.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note in our issue of Sept. 4, p. 404.

Tar Products in Scotland

GLASGOW, Dec. 21.

Quietly steady conditions have prevailed in this market during the week and prices are well maintained.

Refined tar is easing off to some extent, but home price is unchanged at 4½d. to 4⅝d. per gallon, and export business is still being concluded at 3¼d. to 3½d. per gallon, both f.o.r. naked.

Creosote oil.—Production finds a ready outlet as available with prices as under: Specification oil, 5d. to 5¼d. per gallon; low gravity, 6d. to 6¼d. per gallon; neutral oil, 5⅜d. to 6d. per gallon; all *ex* Works in bulk.

Cresylic acid is not too active although some business has been placed during the week as follows: Pale, 99/100%, 2s. to 2s. 2d. per gallon; Pale, 97/99%, 1s. 9d. to 1s. 10d. per gallon; Dark, 97/99%, 1s. 6d. to 1s. 7d. per gallon; all *ex* Works in buyers' packages.

Crude naphtha is still valued at 6½d. to 7½d. per gallon *ex* Works in bulk.

Solvent naphtha.—90/160 grade is 1s. 8½d. to 1s. 9d. per gallon and 90/190 Heavy Naphtha is 1s. 4½d. to 1s. 5½d. per gallon.

Pyridine is in poor request, with prices called 17s. to 18s. per gallon for 90/160 grade and 19s. to 20s. per gallon for 90/140 grade.

Wharncliffe Silkstone Colliery Co., Ltd.—Warrants in payment of the half-yearly preference dividend to Dec. 31, 1940, at the rate of 6% per annum, will be posted on Dec. 31, 1940.

A.R.P.

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GAS STOCKS AND SHARES

Stock Markets continued very quiet again last week, and in the absence of support, prices in many directions were inclined to weaken. British Funds were an exception, however, and although the few price movements were only fractional they were in an upward direction—2½% Consols showed no change at 76¼. Junior home rail stocks remained dull, but the prior charges showed a hardening tendency. Greek bonds lost a little of their former rise. In the miscellaneous market, apart from a few gains among the iron and steel issues, business was small and prices eased. Oil shares fell back on profit-taking, but there were more enquiries for tea shares. Rubber shares remained inactive.

A moderate amount of business was recorded in the Gas market and there were a few more upward movements than of late. It would appear from a glance at the lists below that falls far outnumbered the rises, but with one exception all the former were on account of *ex* div. markings. After a long period of inertia Imperial Continental hardened during the week and closed 4 points higher at 41¼, while South Metropolitan 6% preference gained 2½ to 102½. Several parcels of this stock have changed hands during the past fortnight at 104½. South Suburban and Wandsworth 4% preference stocks both hardened 3 points to 65½. On the Provincial Exchanges, Newcastle units rose 3d. to 16s. 9d., but in the Supplementary List, apart from *ex* div. markings, the two East Surrey preference stocks were marked down.

Quotations on the London and Provincial Stock Exchanges

OFFICIAL LIST

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Dec. 19.	Rise or Fall on week.
1,767,439	Sept. 16	7	7	Alliance & Dublin Ord. ...	112—122	...
374,000	July 1	4	4	Do. 4 p.c. Deb. ...	90—95	...
957,608	Nov. 4	5	5	Asscd. Gas & Water U'd'ts Ord.	12/—14/—	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	15/6—17/6	...
535,545	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	14/6—16/6	...
336,646	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	12/—14/—	...
561,370	Aug. 12	7	7	Barnet Ord. 7 p.c.	98—103	...
300,000	Oct. 14	1/9⅜	1/4⅛	Bombay, Ltd.	19/6—21/6	..
690,407	Aug. 19	7	7	Bournemouth 7 p.c. max. ...	100—110	..
362,025	Dec. 16	4	4	Do. 4 p.c. Deb. ...	79—84	—1
659,955	Aug. 19	6¾	4⅛	Brighton, &c., 5 p.c. Con. ...	65—75	...
855,000	Sept 30	8	6	Brit. Gas Light Ord.	75—85	...
545,000	Dec. 16	5½	5½	Do. 5½ p.c. 'B' Cum. Pref	108—113*	—2
120,000	,,	4	4	Do. 4 p.c. Red. Deb.	73—78*	—2
10,000	Nov. 6, '33	6	4	Cape Town, Ltd., 4½ p.c. Cu. Pf.	⅛—¼	..
626,860	July 15	5 5/10	6	Cardiff Con. Ord.	89—94	...
24,500	Sept. 23	7	7	Colombo Ord. 7 p.c. Pref. ...	19/—21/—	...
764,169	Oct. 7	/11.48	-/11.48	Colonial Gas Assn. Ltd. Ord. ...	14/—16/—	...
400,000	,,	1/3.30	1/3.30	Do. 8 p.c. Pref. ...	19/—21/—	...
1,748,935	July 22	2	3	Commercial Ord.	37—42	...
620,000	Dec. 9	3	3	Do. 3 p.c. Deb.	57—62	...
286,344	Aug. 19	5	5	Do. 5 p.c. Deb.	87—92	...
807,560	Aug. 12	7	6	Croydon sliding scale	83—88	...
644,590	,,	5	5	Do. max. div.	79—84	...
620,385	July 1	5	5	Do. 5 p.c. Perp .Deb. ...	90—95	...
179,500	Aug. 19	5⅓	5	East Surrey 'B,' 5 p.c.	60—70	...
176,461	Dec. 16	5	5	Do. 5 p.c. Deb. (Irred.)...	87—92*	—3
250,000	Nov. 11	4	6	Gas Consolidation Ord. 'B' ...	13/6—14/6	...
250,000	Nov. 11	4	4	Do. 4 p.c. Red. Cum. Pref.	15/—17/—	...
19,123,081	July 29	3⅜	4½	Gas Light & Coke Ord. ...	14/—15/-*a*	...
2,600,000	,,	3½	3½	Do. 3½ p.c. max.	50—55	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	71—76	...
2,993,000	July 8	3⅜	3⅜	Do. 3⅜ p.c. Red. Pref. ...	82—87	+2
8,602,497	Dec. 2	3	3	Do. 3 p.c. Con. Deb. ...	67—72*	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	100—105	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	98—103	...
700,000	Sept. 9	3½	3½	Do. 3½ Red. Deb. ...	80—85	...
5,600,000	May 13	4	8	Imperial Continental Cap. ...	39—44	+4
43,820	July 29	3½	3½	Do. 3½ p.c. Red. Deb. ...	63—68	...
231,978	Aug. 19	5	5	M.S. Utility 'C' Cons.	68—73	...
918,657	,,	4	4	4 p.c. Cons. Pref.	72—77	...
675,000	Nov. 11	†4	†4	Montevideo, Ltd.	52—57	...
300,000	Nov. 18	7	9	Oriental, Ltd.	95—105	...
368,537	Dec. 9	8	6½	Plymouth & Stonehouse 5 p.c.	88—98	...
621,667	Aug. 19	8⅛	7½	Portsmouth & Gosport Cons.	90—95	...
648,999	Sept. 16	1/1	1/1½	Severn Val. Gas Cor. Ld. Ord.	13/—15/—	...
597,972	,,	-/10⅜	-/10⅝	Do. 4½ p.c. Cum. Pref. ...	15/6—17/6	...
2,528,714	Sept. 2	1/—	-/7⅛	South East'n Gas Cn. Ld. Ord.	9/—11/—	...
1,000,000	,,	-/10⅛	-/10⅝	Do. 4½ p.c. Red. Cum. Pref.	14/—16/—	...
1,068,869	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	13/—15/—	...
6,709,895	Aug. 5	4	4	South Met. Ord.	53—58	..
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	100—105	+2½
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	69—74	...
1,895,445	July 1	3	3	Do. 3 p.c. Perp. Deb. ...	60—65	...
1,000,000	July 15	5	5	Do. 5 p.c. Red. Deb. ...	97—102	...
1,543,795	July 22	3	4	South Suburban Ord. 5 p.c. ...	62—67	...
512,825	July 8	5	5	Do. 5 p.c. Perp. Pref. ...	85—90	...
500,000	,,	4	4	Do. 4 p.c. Perp. Pref. ...	63—68	+3
250,000	,,	3⅜	3⅜	Do. 3⅜ p.c. Red. Pref. ...	80—85	..
888,587	Dec. 16	5	5	Do. 5 p.c. Perp. Deb. ...	90—95	—2
750,541	Aug. 9	5½	5	Southampton Ord.	57—62	...
350,000	Feb. 12	5½	5½	Swansea 5½ p.c. Red. Pref. ...	91—96	...
1,076,495	Aug. 5	5	5	Tottenham & District Ord. ...	62—67	...
338,555	,,	5	5	Do. 5 p.c. Pref.	78—83	...
453,380	Dec. 9	4	4	Do. 4 p.c. Perp. Deb. ...	76—81	...
1,247,505	May 20	4	6	U. Kingdom Gas Cor. Ord. ...	13/—15/—	...
1,085,952	Nov. 25	4½	4½	Do. 4½ p.c. 1st Cum. Pref. ...	13/6—15/6	..
772,709	,,	4	4	Do. 4 p.c. 1st Red. Cum.Pref.	13/—15/—	...
745,263	Dec. 16	4½	4½	Do. 4½ p.c. 2nd Non.Cum. Pf.	12/—14/-*	—/6
1,200,000	Sept. 9	3½	3½	Do. 3½ p.c. Red. Deb. ...	82—87	..
380,606	Aug. 5	7	6¾	Uxbridge, &c., 5 p.c.	80—90	...
1,371,138	July 8	3½	4	Wandsworth Consolidated ...	66—71	..
2,525,768	,,	4	4	Do. 4 p.c. Pref.	63—68	+3
1,343,964	Dec. 16	5	5	Do. 5 p.c. Deb.	88—93*	—2
383,745	,,	4	4	Do. 4 p.c. Deb.	75—80*	—5
558,342	July 15	6	5	Watford & St. Albans Ord. ...	85—90	—3
300,000	Dec. 9	3½	3½	Do. 3½ p.c. Red. Deb. ...	84—89*	...

SUPPLEMENTARY LIST

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Dec. 19.	Rise or Fall on week
351,685	Dec. 16	5	5	Brighton, &c., 5 p.c. Perp. Deb.	88—93*	—2
28,700	,, 17	5½	5½	Do. 5½ p.c. Red. Deb. 1942 ...	95—100*	—1
415,250	,, 17	4	4	Bristol Gas Co., 4 p.c. New Deb.	85—90	...
140,205	July 29	7	7	Cambridge, &c., 7 p.c. Cons. 'B'	100—110	...
295,932	Aug. 19	5	5	Cheltenham, 5 p.c. Cons. Ord....	88—93	...
42,500	Dec. 16	4	4	Do. 4 p.c. Perp. Deb....	75—80*	—7
150,000	Aug. 12	4	4	Croydon Gas, 4 p.c. Pref. (Irr.)	65—75	...
130,000	July 1	4	4	Do. 4 p.c. Deb. ...	75—80	...
146,700	Aug. 19	5½	5½	East Surrey, 5½ p.c. Pref. 'A' ...	80—90	—7½
53,220	,, 19	6	6	Do. 6 p.c. Cum. Pref. ...	90—100	—2½
117,425	Feb. 5	8	8	East Wight, 5 p.c. Cons. Ord. ...	100—110	...
...	Aug. 19	6	4	Eastbourne, 'B' 3½ p.c.... ...	65—75	...
239,135	Nov. 11	5	5	Gas Consolidation 'A' Ord. (£1)	13/—15/—	...
156,600	Aug. 19	5	5	Hampton C't, 5 p.c. Cons. Ord.	68—73	...
18,000	Dec. 2	7	7	Malta & Med'n., 7 p.c. 1st Pref.	55—65	...
10,845	,, 2	7½	7½	Do. 7½ p.c. 2nd Pref.	55—65	...
50,000	Aug. 19	£5 19 6	£5 4 6	Mid. South. Util., 'A' Cons. 5 p.c.	60—70	
65,000	Aug. 12	5	5	North Middlesex, 5 p.c. Pref. ...	87—92	...
70,000	Sept. 9	5	5	Plymouth & Stone., 5 p.c. Deb.	87—92	...
76,501	July 1	4	4	Reading, 4 p.c. Perp. Deb. ...	75—80	...
74,777	Sept. 30	4	4	Romford, 4 p.c. Debs. (Reg.) ...	77—82	...
21,000	Dec. 16	5	5	Slough, 5 p.c. Perp. Deb. ...	87—92*	—3
211,740	,, 17	5	5	Southampton, 5 p.c. Red. Deb.	90—95	...
363,575	July 1	5	5	Tottenham, 5 p.c. Reg. Red. Mt.	95—100	...
202,019	Oct. 14	6¾	6¾	Tunbridge Wells, 4 p.c. Scale ...	70—80	...
135,257	June 10	5	5	Uxbridge &c., 5 p.c. Perp. Deb.	90—95	...

PROVINCIAL EXCHANGES

					Quotations Dec. 13.	
47,756	July 26	6	5	Bath Cons.	95—100	...
122,577	July 22	7	6	Blyth 5 p.c. Ord.	100—105	...
1,667,250	July 15	5	5	Bristol, 5 p.c. max.	90—93	...
120,420	June 17	4	4	Do. 1st 4 p.c. Deb.	94—96	...
415,250	,,	4	4	Do. 2nd 4 p.c. Deb. ...	92—95	...
328,790	,,	5	5	Do. 5 p.c. Deb.	108—111	...
157,150	Aug. 5	6½	5	Chester 5 p.c. Ord.	98—101	...
92,500	June 17	4	4	Do. 4 p.c. Pref.	80—85	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	80—85	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	94—98	...
542,270	Aug. 12	9	6	Derby Cons.	100—105	...
55,000	June 10	4	4	Do. 4 p.c. Deb.	96—102	...
10,000	Aug. 19	10	10	Great Grimsby 'A' Ord. ...	165—175	...
6,500	,,	10	10	Do. 'B' Ord.	165—175	...
79,000	,,	10	10	Do. 'C' Ord.	155—165	...
732,000	Aug. 26	4	4	Hartlepool G. & W. Cn. & New	61—63	...
2,167,410	Aug. 19	6	6	Liverpool 5 p.c. Ord.	97—100	...
245,500	June 17	5	5	Do. 5 p.c. Red. Pref. ...	97½—100½	...
306,083	July 15	4	4	Do. 4 p.c. Deb.	99—101	...
20,000	June 24	5	5	Long Eaton 5 p.c. Pref.	9—11	...
80,000	June 24	5	5	Do. 5 p.c. Deb.	92—97	...
2,430,267	July 29	5 7/10	5	Newcastle and Gateshead Con.	16/3—17/3*a*	+-/3
682,856	,,	4	4	Do. 4 p.c. Pref.	75—77	+1
776,706	Dec. 27	3½	3½	Do. 3½ p.c. Deb.	80—85	...
277,285	April 24	5	5	Do. 5 p.c. Deb. '43 ...	97—102	...
274,000	July 26	5	5	Newport (Mon.) Ord.	89—93	...
13,200	Sept. 16	8⅝	7	Pontyp'l Gas & W. 10 p.c. 'A'	11¼—12½	...
13,600	,,	6	5	Do. 7 p.c. 'B'	9¼—10½	...
40,000	,,	5	6	Do. 7 p.c. 'C'	9¼—10¼	...
106,280	Aug. 5	8	10	Preston 'A' 10 p.c.	157—167	...
188,219	,,	7	7	Do. 'B' 7 p.c.	113—123	...
1,806,339	Aug. 26	6½	6½	Sheffield Cons.	118—120	...
95,000	July 8	4	4	Do. 4 p.c. Deb.	97— 99	...
332,351	Feb. 5	6	6	Sunderland 6 p.c. max. ...	107—112	...
140,778	Aug. 12	5	5	Weston-super-Mare Cons. ...	80—85	...
64,338	June 24	4	4	Do. 4 p.c. Deb.	75—85	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	137—145	...

a.—The quotation is per £1 of Stock. * Ex. div. † Price free of income-tax.

East Engine Library

is about 600 cu.ft. per hour. Occasionally these burners have to be renewed, but this only occurs about once a year and the work is carried out in the workshops. The holes in the atmospheric burners are kept clear of dirt and the oven is thoroughly cleaned out about every 2–3 months. The steel plates sometimes sag, but these are turned upside down or changed from one side to the other, and thus come back into their original state.

After burning off, these appliances are sand-blasted, steel shot being used instead of sand. Although the steel shot does not give so good a finish as the sand, it is nevertheless quite efficient. Care is taken not to allow the steel shot to ricochet from the sandblast through the workshops, as these steel balls get lodged in the soles or heels of boots and are liable to cause accidents through slipping. To obviate this a baffle is placed as near the sandblast machine as possible, and this keeps the steel shot in this vicinity. The operator on the sandblast machine wears a pair of goggles and is supplied with two sets of overalls and is also issued with a pair of clogs annually.

This plant incidentally is examined and reported on by our Safety-First Inspector twice per annum. This is duly reported in the General Register and Examination Register, which are kept for the Factory Inspector's examination, the report dealing principally with the condition of the pipes, hood, ducts, &c.

After blasting, the appliances are taken to the benches and examined. The cast-iron crown plate is taken off and the internal cast-iron crown plate removed. The slag wool is examined and renewed if necessary. If the enamel linings require renewing these are replaced and the cooker is repacked with slag wool. Then the cooker is re-assembled after the oven rail is examined and tested. The injectors are taken out and red-leaded. Occasionally the oven rails are faulty, and these are renewed. To obviate any delay a stock of 12 rails of each size is kept. These are made up in the workshops and kept ready for use. The oven supply pipe is then fitted and the bridges are screwed into position. The cornices are drilled if required for efficiency cock rails. A jig is placed on the cornice and six holes are drilled (¼-in. clearing holes). The holes are then countersunk to avoid any projections above the level of the cornice. A new cock rail is then fitted and a set of cornice bars, burners, &c., is supplied. If the cooker is already an efficiency pattern, the cock rail is cleaned and the jet cocks are re-ground and tested before being fitted to the cooker. After this operation has been completed the cooker is then taken to the painters, and after their attention it is sent to the tester's bench. The cookers are tested in batches of five or six at one time. The smell of paint is removed by burning off and the burners are regulated and set for the district pressure, which is about 40 tenths. The doors are tested for tightness and the cooker is given a thorough inspection before being passed for issue. The enamel crown plate, grill pan, and grid and drip pan are then added to the cooker and these are packed into the oven together with the burners, and the cooker is then placed ready for issue. An asbestos plate is issued along with each cooker, and a plate rack and tray also if desired, but this is a chargeable item.

The hotplates, grillers, and boiling rings are treated similarly to cookers—*i.e.*, the cock rails are made ready for the different sizes of hotplate, and the injectors are fitted to the boiling rings and grillers, tested, and painted ready for issue.

High grade or enamel cookers are treated in a different way from the black cookers. Experiments have been carried out and it is found that instead of dismantling enamel cookers and placing the enamels in a soda bath it is more convenient, and less costly, to apply a paste to the oven itself. In dismantling appliances there is always the risk of screws breaking in, necessitating the drilling out and tapping of new holes and the liability to damage of cooker parts, causing delays and expense. The process carried out in the workshops is as follows :

The enamel cookers are taken in batches of 12. The burners are taken from all these cookers and placed in tins and burnt off in the gas oven, along with the black cookers. The tins are labelled with tags and cookers are labelled similarly to avoid mixing. The cookers are next placed on their backs, and the paste is applied with a brush and left in this position and condition for about 24 hours.

The paste is then removed with a wire brush and hot water. The man engaged in these operations wears rubber gloves and is supplied with clogs and overalls. After the cookers are put through these processes they are " touched up " with paint. The burners are blasted, painted, and then fitted to the cookers and placed ready for test. The cock rails are examined, and the jet cocks ground in and tested by the brass finishers before being released for refitting. After all parts are assembled the cookers are taken to the testing bench for burning off and regulating prior to re-issue.

The following data give an indication of an average test recently carried out in new workshops in connexion with the overhaul and reconditioning of enamel cookers :

Overhauling 12 *H.G. Enamel Cookers.*

Labour :	Burning off, blasting, painting, and assembling, testing, &c. . . .	11¼ hours.
,,	Washing shells of cookers . . .	32 ,,
	Total	43¼ ,,
,,	Grinding in jetcocks in cock rails (brass finisher)	12 hours.

Cost :	43¼ hours at 1s. 2.85d. = 1s. 3d. . .	£1 14s. 1d.
		£ s. d.
Cost :	43¼ hours at 1s. 2.85 = 1s. 3d. . .	2 14 1
,,	12 ,, 1s. 5.43d. = 1s. 6d. . .	18 0
Materials and gas	. . . . .	8 6
		£4 0 7

12 cookers = £4 0s. 7d.
1 cooker = 6s. 9d. per cooker 6s. 9d. cooker.

It is found that in dealing with various types of gas appliances a considerable amount of damage is done by the wrong use of tools. As each new appliance comes along it is sometimes necessary to review the types of tools used by workmen. The most popular tools used appear to be footprints and pliers, and these damage stopcocks and other fittings to a degree in many cases which puts them beyond repair. Sometimes it is the design of stopcocks which does not permit the use of any other tool, except pliers or footprints. Whenever possible it is found that if hexagons were fixed to stopcocks, &c., and proper shifting spanners used, the appearance of these enamel appliances would be preserved, particularly when chromium plated stopcocks and other specially finished types are used. Not only that, but the obvious damage done to other stopcocks not seen, by the over-zealous use of footprints, would no doubt repay departments by these fittings having hexagons fitted. This would permit of a proper spanner being used and no damage being done to fittings by footprints. Screwdrivers are sometimes responsible for damage to fittings also. A large screwdriver should not be used if a small one can do the job properly. Recently this was demonstrated by the wrong use of a large screwdriver on a fitting which was ruined entirely, and cost the consumer (who was responsible in this case) a new part. The appliance in question was a gas lighter.

All stopcocks, pendants, &c., are tested in the workshops before being issued to the district. The stopcocks are screwed to a jig and this is submerged in water. A pressure of 5 lb. per sq. in. is used. As many as eight stopcocks can be tested at one time, and results justify these measures. Faulty ones are returned to manufacturer and replacements claimed. Stopcocks are also examined to see if these conform to pattern. Three pendants are tested at one time. A special trough is used for this purpose. A bubble quickly shows up any faulty fitting. Stopcocks have also to pass this test.

The brassfinishers overhaul and test all cock rails and grind in and repair all types of brass fittings which are returned from the district. Brass tubes are straightened and softened by brassfinishers. Gas irons are overhauled, cleaned, and regulated, while service pumps, pressure gauges, blow lamps are repaired in this section. Special fittings such as brass diminishers iron to brass, male and female, &c., are turned out in the lathes, and any alterations to pendants, roof plates, and gas brackets are done in this section.

The tinsmiths are responsible for the making of backplates, boxplates, flues, flue knees, flue pipes, cowls, &c. These are made to sketches supplied by the inspectors or gasfitters, and the time taken is recorded on a workshop sheet issued from the office.

Water heaters of all types are repaired and overhauled by the tinsmiths. Leaks are sometimes found by pumping up to a pressure of 25 lb. per sq. in. on boilers and soapy water applied round the boilers in question. A " blowing out " is quickly detected and the fault is repaired or the appliance is returned to the makers for their attention. Geysers are repaired and tested before being returned to the district. A mirror is used for observation purposes, as sometimes condensation is liable to give the impression of a leak. Burners are replaced if faulty and the by-passes are adjusted and regulated.

East Engine Library

Gas Journal

LIGHT - HEAT - POWER - BY-PRODUCTS

Vol. 232. 92nd Year. LONDON, DECEMBER 25, 1940. No. 4049. Price 1/-

Registered as a Newspaper

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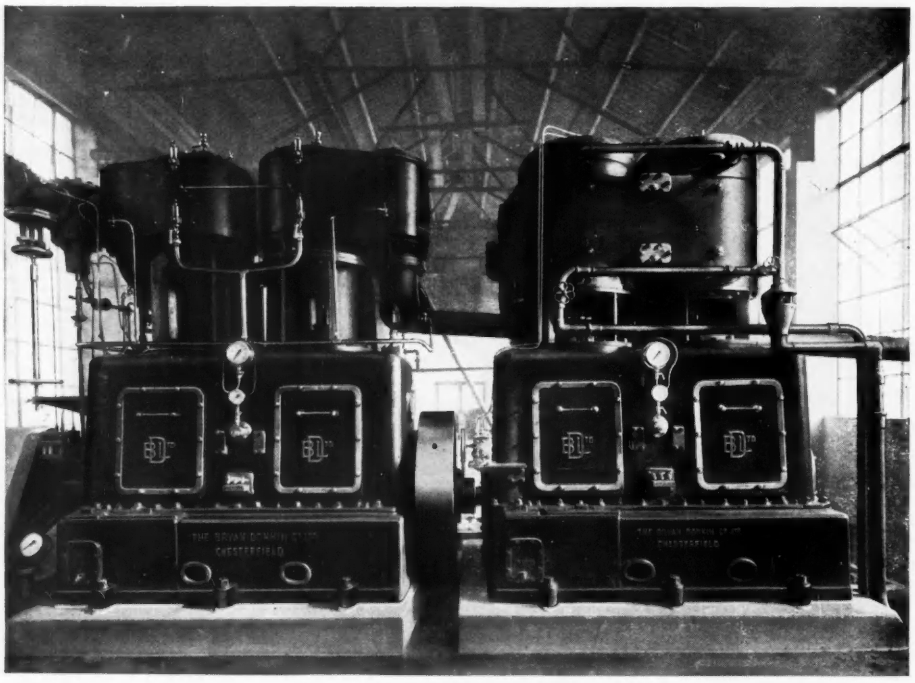

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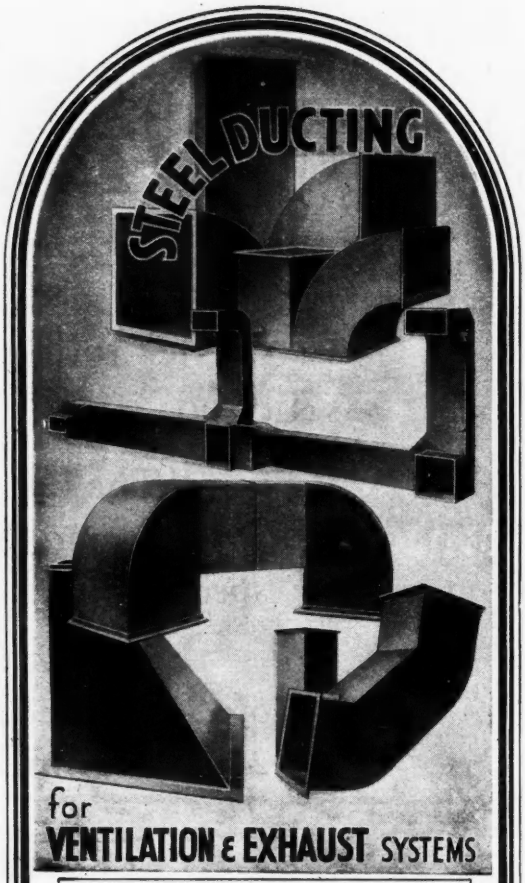

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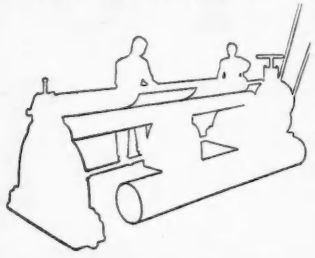

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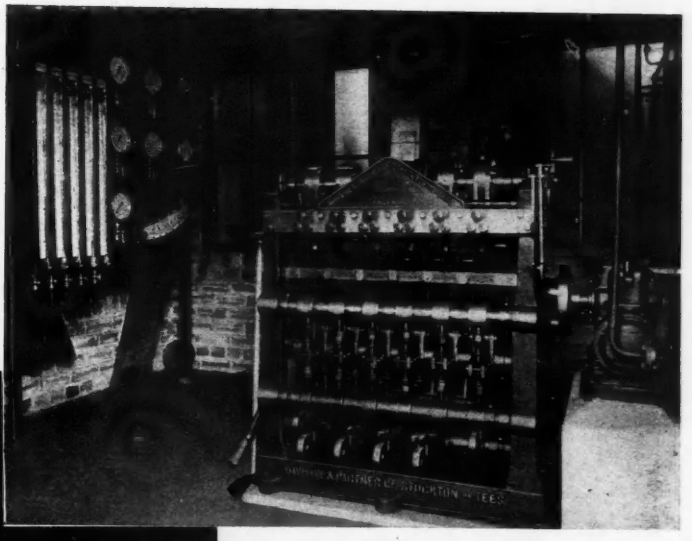

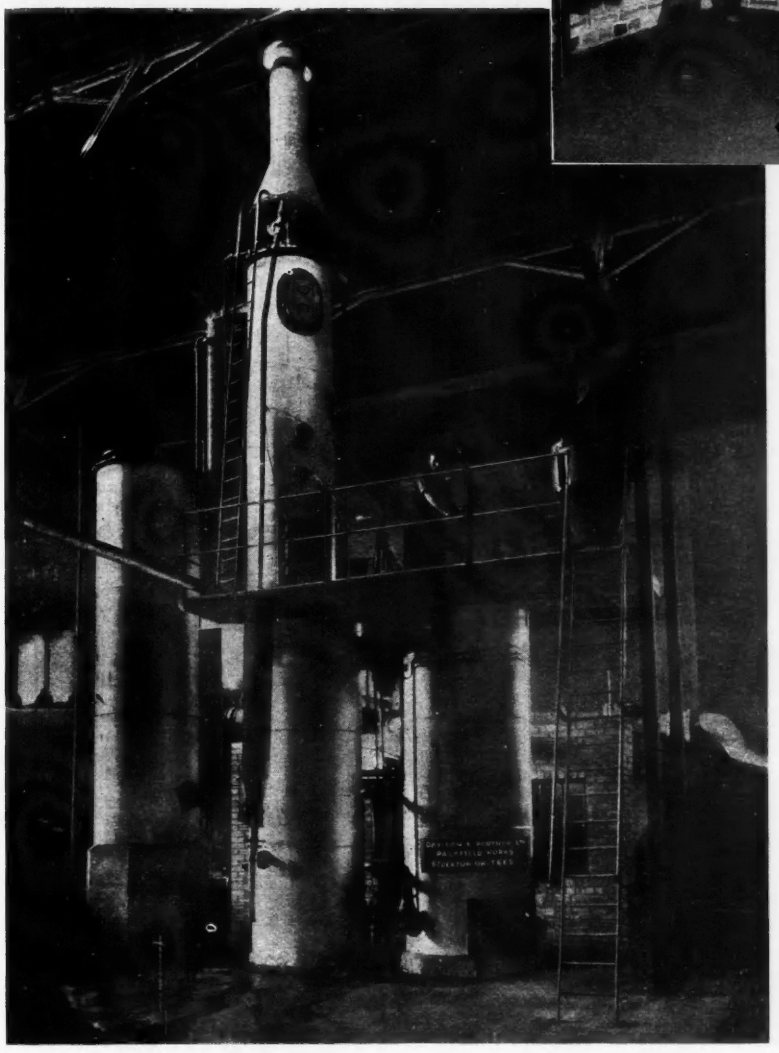

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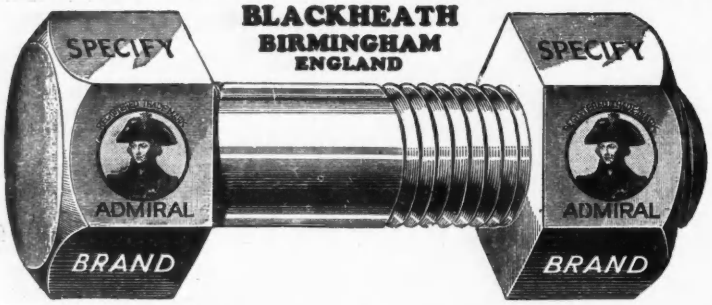

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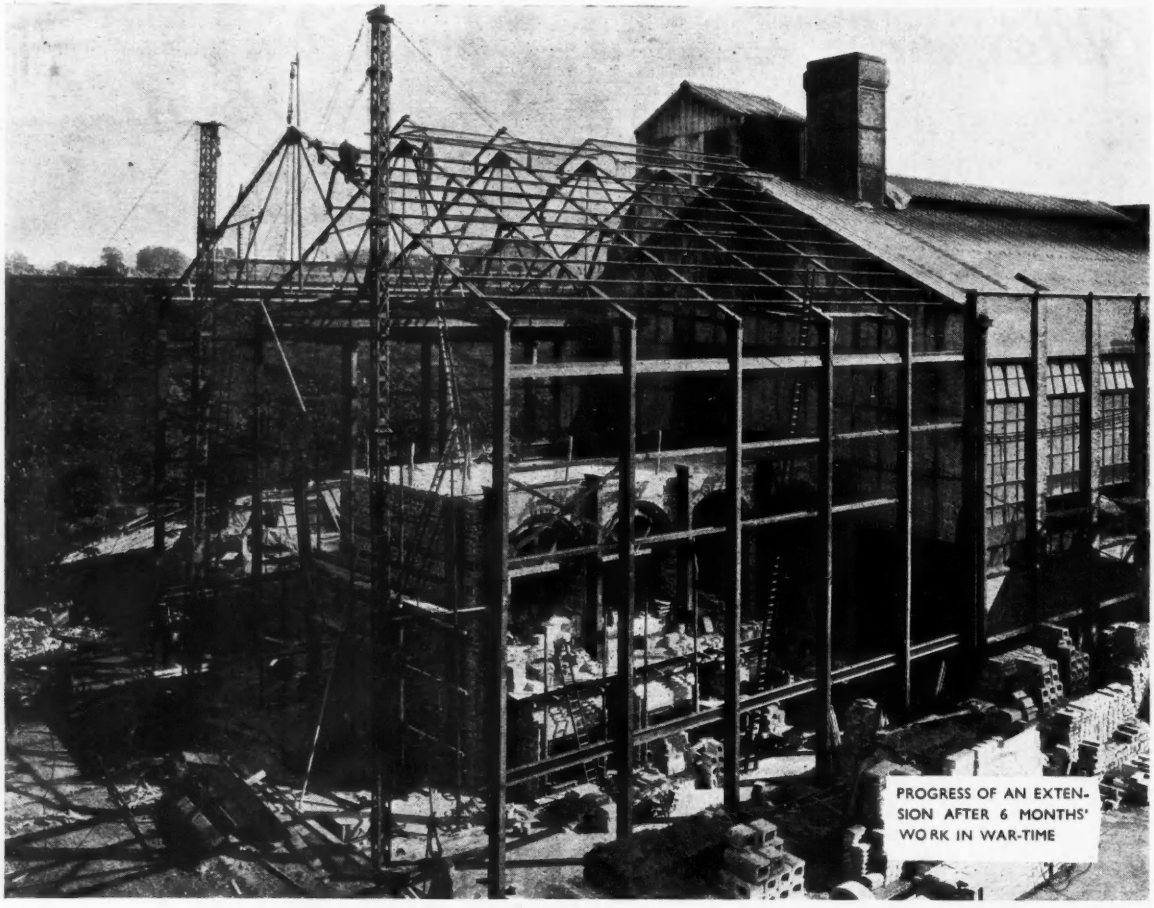

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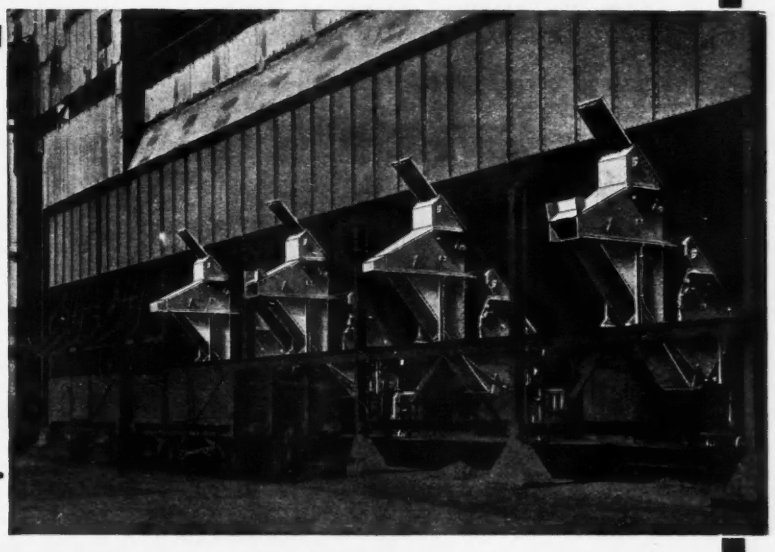

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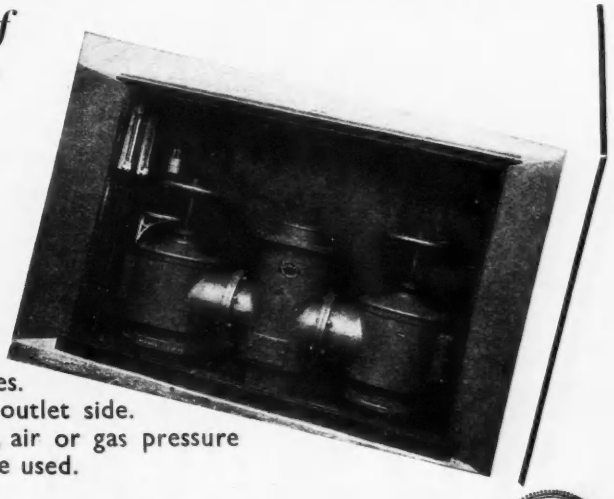

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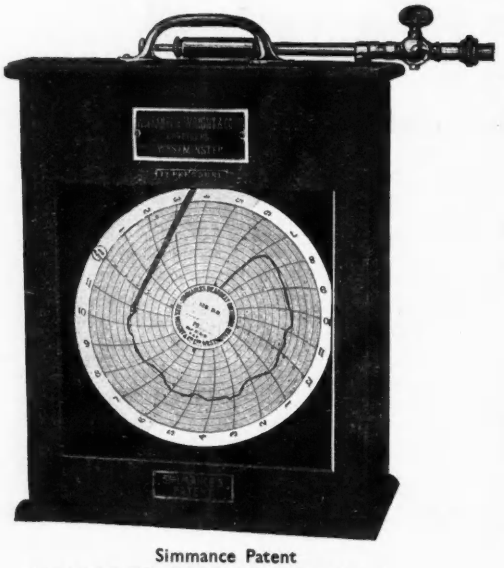

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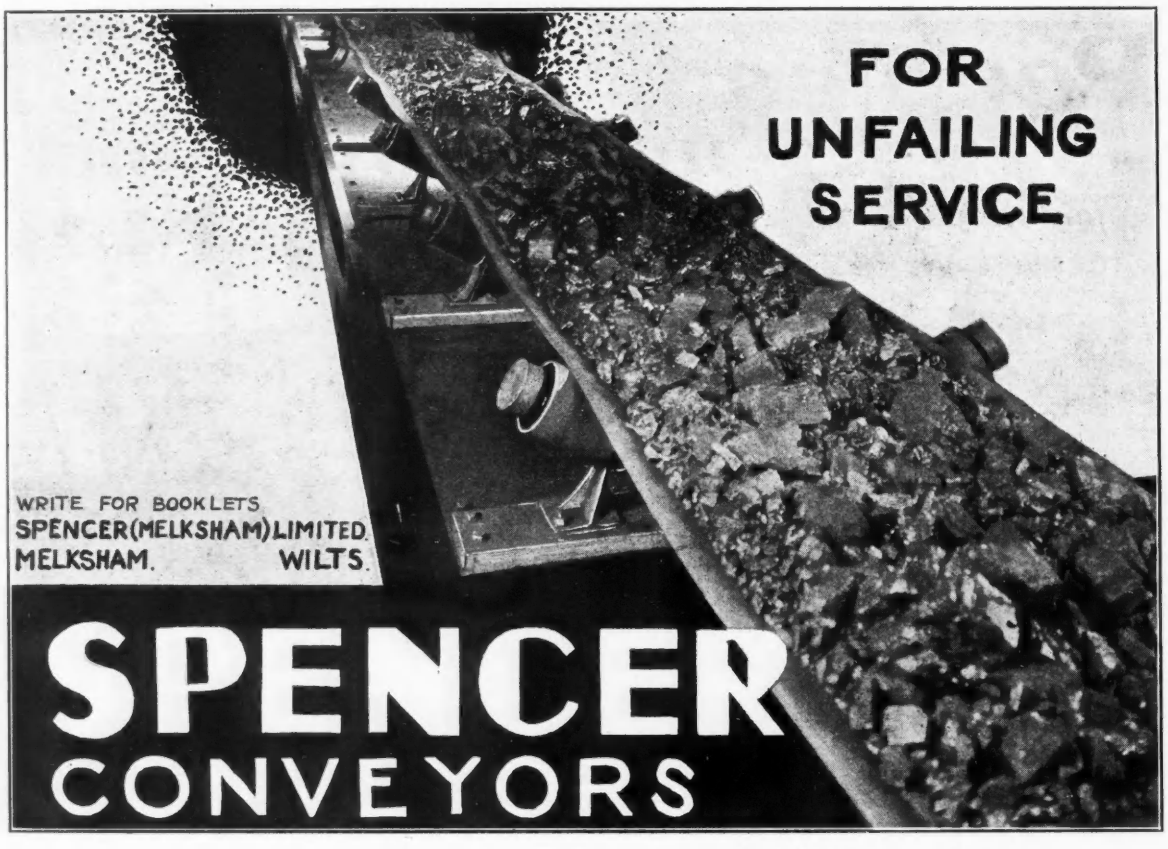

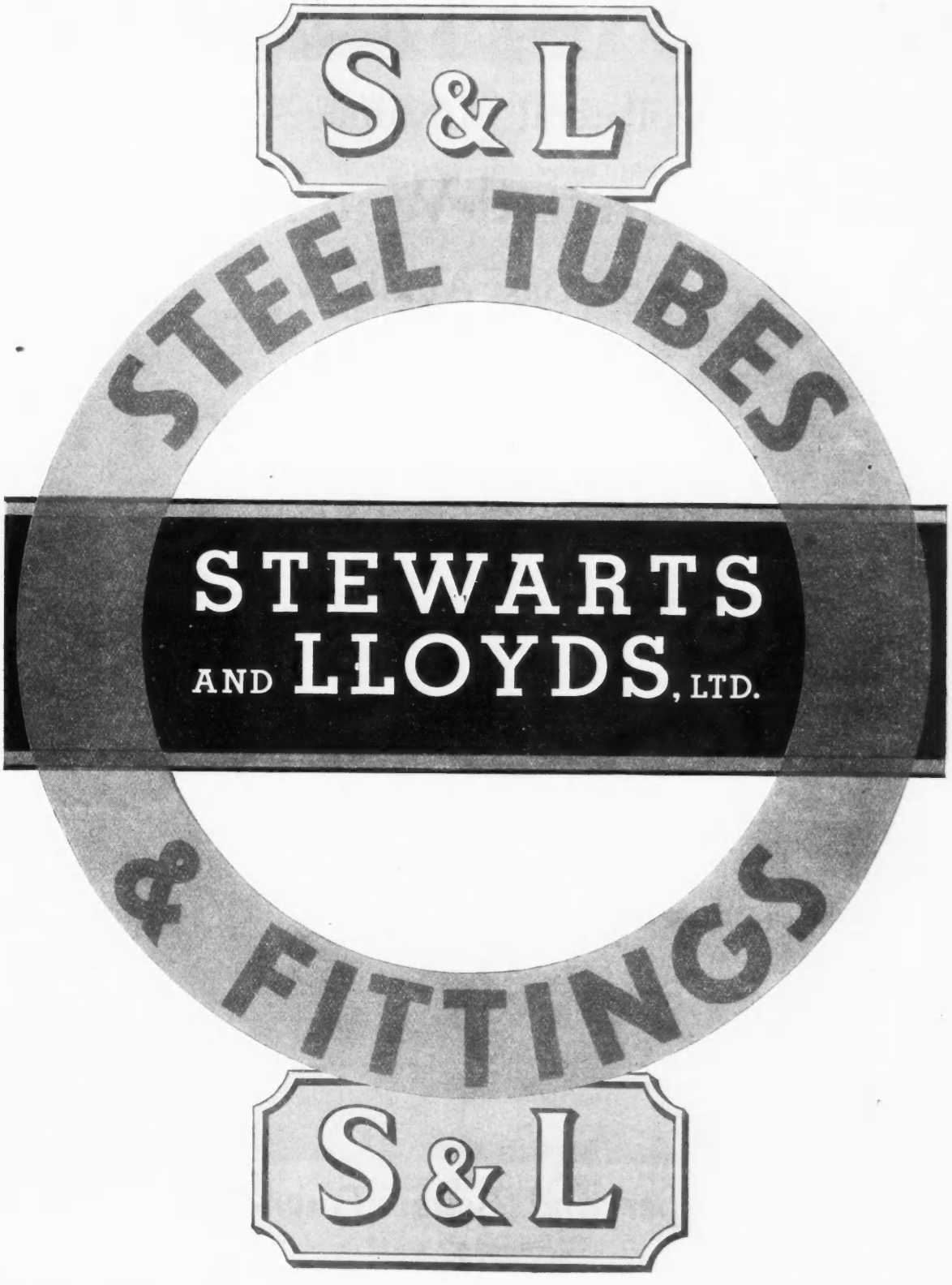
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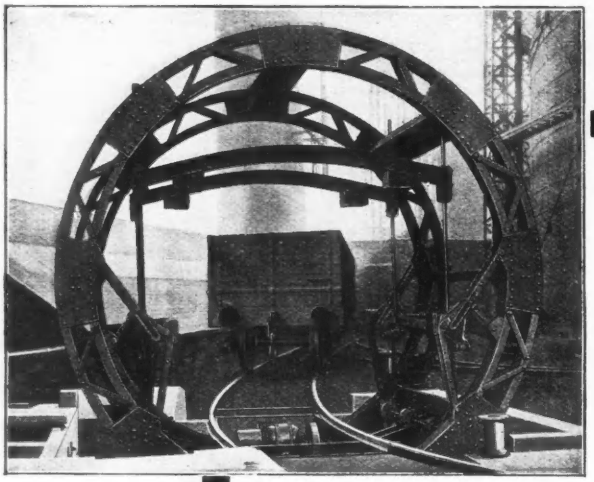

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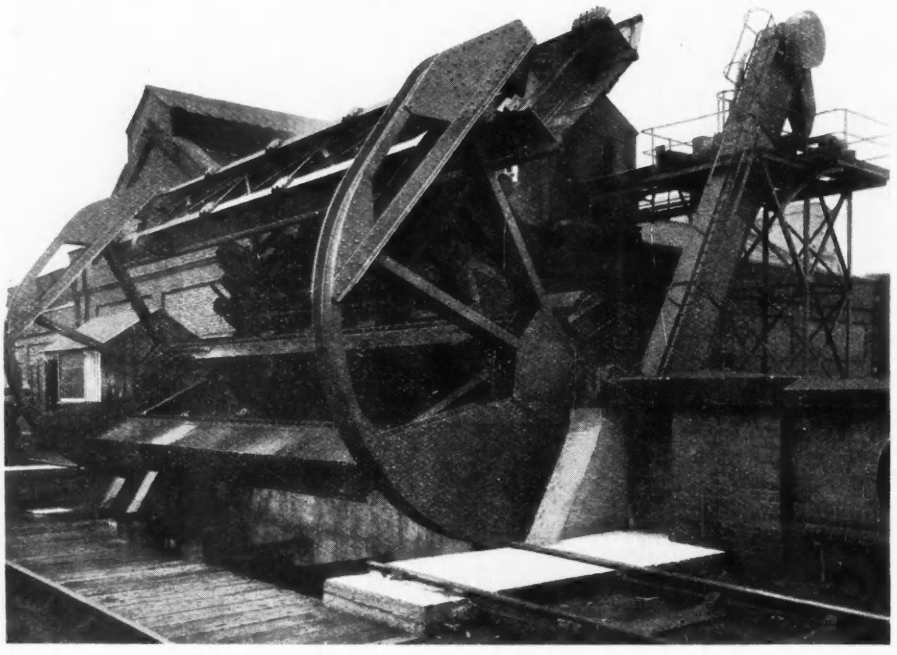

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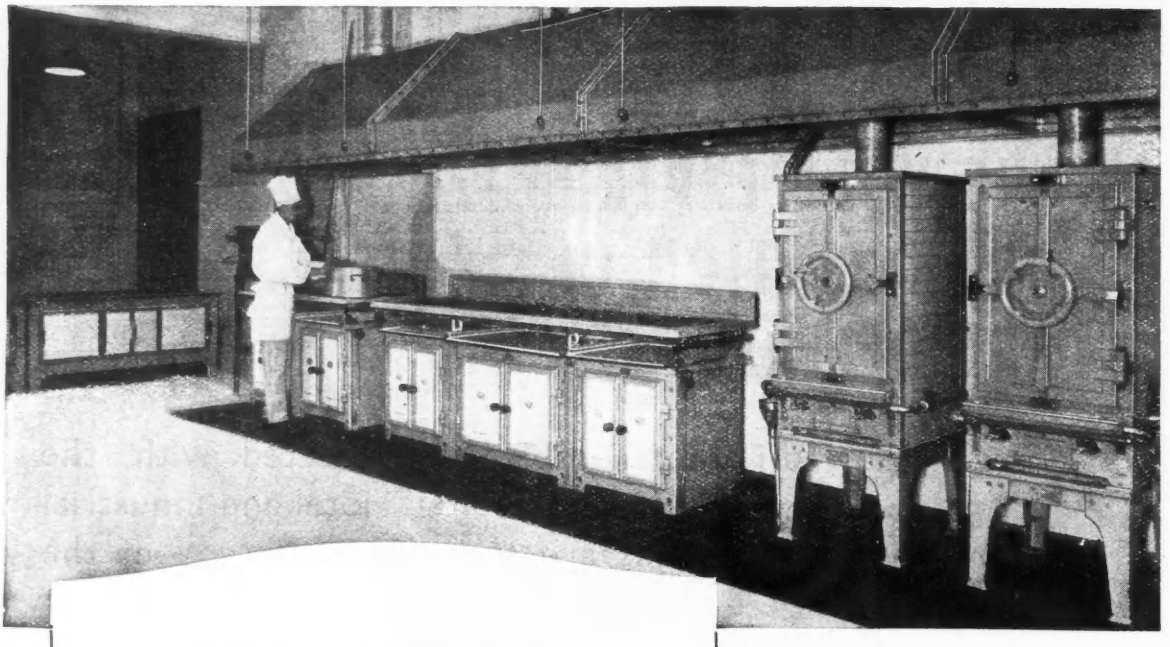

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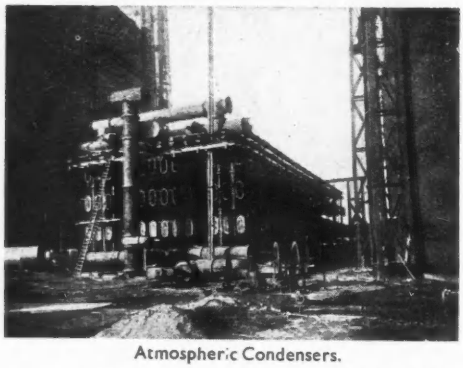

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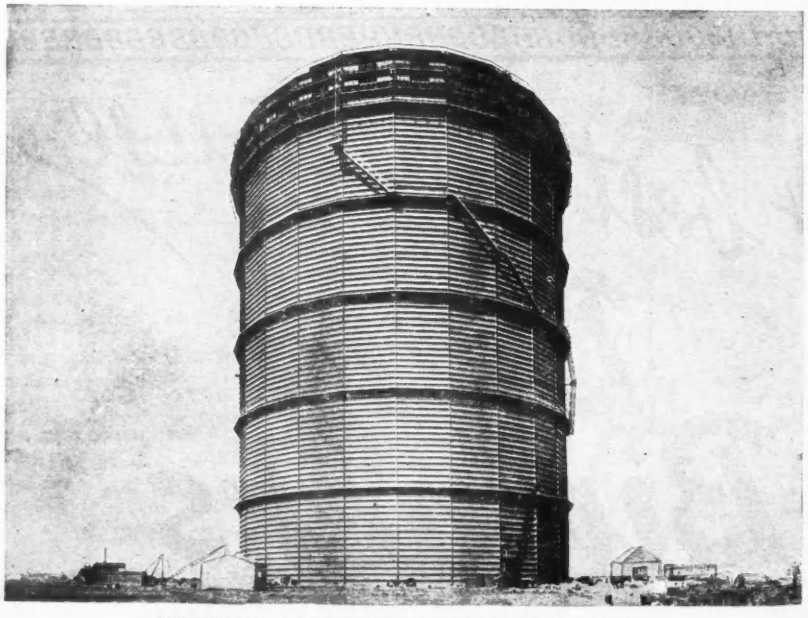

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The DIRECTORS, MANAGEMENT and STAFF offer their Good Wishes to the Gas Industry for the coming year, and hope that even in these troublesome times Christmas may still be Christmas

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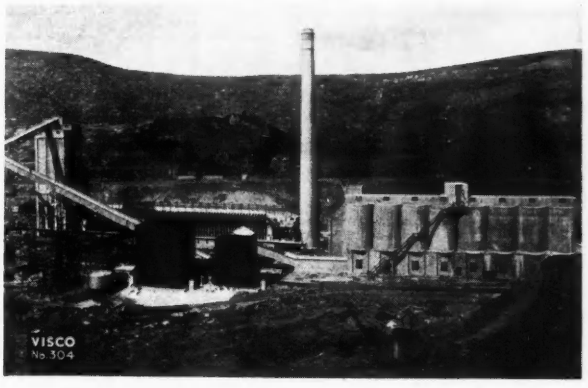

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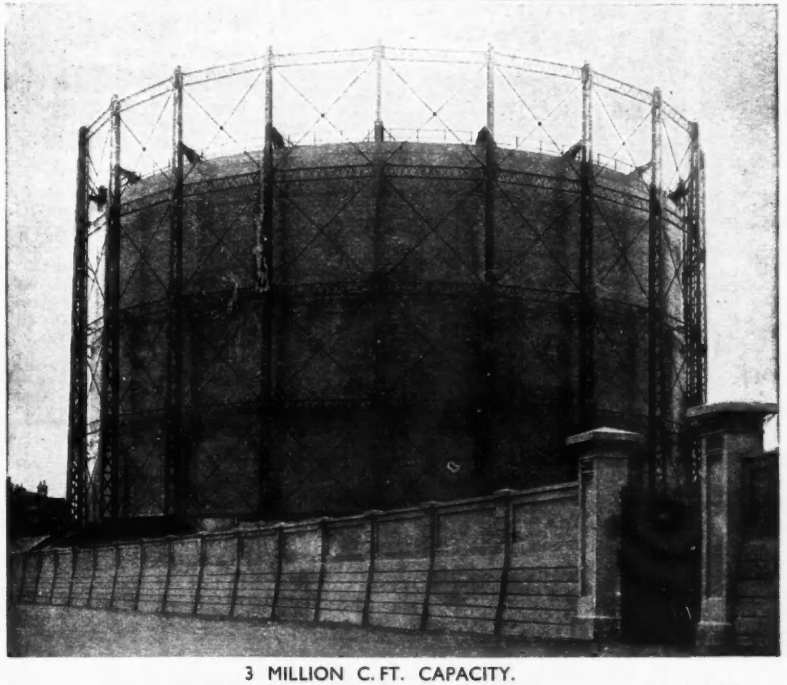

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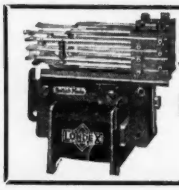

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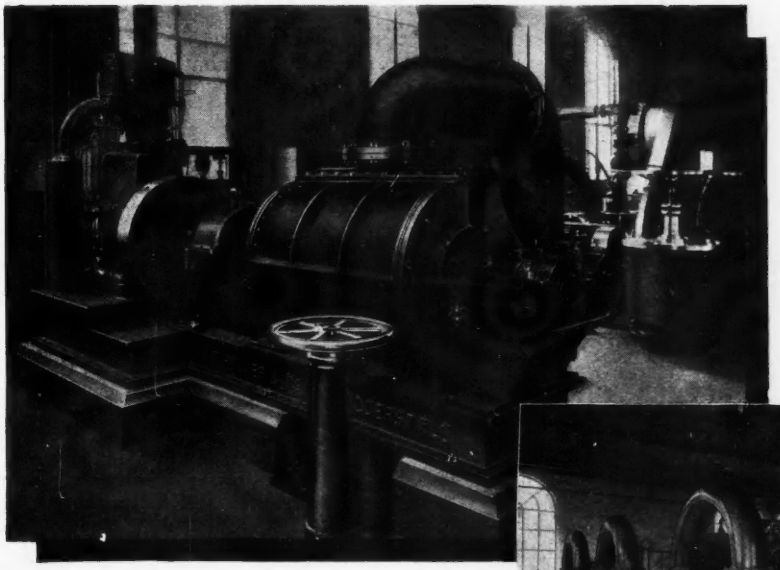

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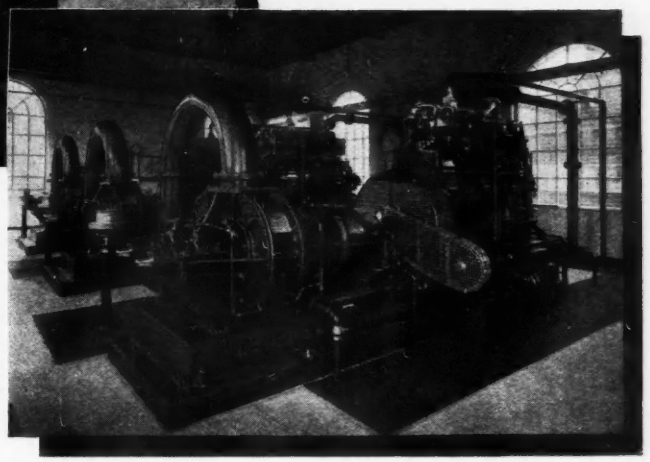

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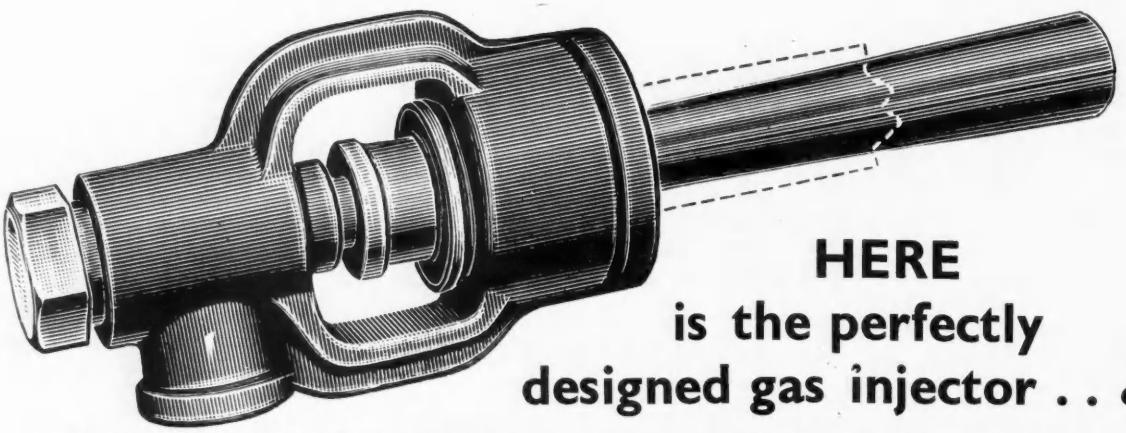

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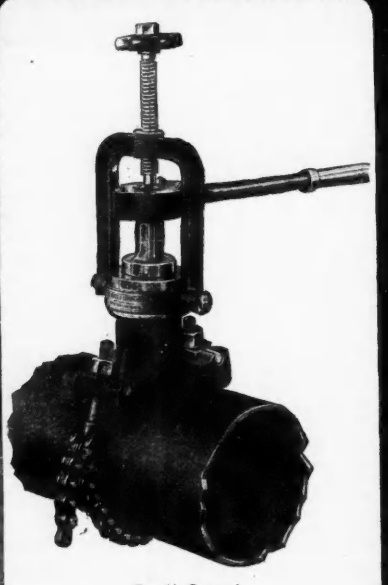

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